

# *The* Earth Science

## D I G E S T

*Special Issue*

CONVENTION PROGRAM



MILWAUKEE CIVIC AUDITORIUM

14th ANNUAL CONCLAVE

**MIDWEST FEDERATION of MINERALOGICAL  
and GEOLOGICAL SOCIETIES**

June 24, 25, and 26, 1954

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May - June, 1954

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Fourteenth Annual Convention  
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**MIDWEST FEDERATION**  
of  
**MINERALOGICAL and  
GEOLOGICAL SOCIETIES**



To be held in  
**The MILWAUKEE CIVIC AUDITORIUM**  
Milwaukee, Wisconsin  
June 24, 25, and 26, 1954  
Host Society  
**GEOLOGICAL SOCIETY of WISCONSIN**  
Elmer R. Wurl, President



**HURRAH!!**

*We're  
all  
Here*

**June  
24-25-26  
1954**

## **"MEET ME IN MILWAUKEE"**

**Midwest Mecca in '54**

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Exhibits:—

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Juneau Hall, Milwaukee Auditorium

Gilbert J. Thill.....*Non-Commercial Chairman*  
Kilbourne Hall, Milwaukee Auditorium

## **OFFICIAL CONVENTION PROGRAM**

**Thursday, June 24, 1954**

9:00 Registration

11:00 Lapidary Section Meeting—*John N. Heffelfinger*.....Room D  
"Lapidary Methods"—*B. M. Brehm*

— Luncheon —



- 1:30 Mineral Section Meeting—*John C. Thornton*.....Room A  
 "Nevada and Its Mineral Resources"—S. Vernon Wines,  
 Engineer, Standard Magnesium Co., San Francisco, California.
- 2:30 Field Trip to Milwaukee-Downer College Museum, Greene Memorial Museum.
- 7:30 General Meeting.  
 Welcoming Address—W. C. McKern, Director of Milwaukee Public Museum Convention Announcements.  
 Response and Lecture: To be announced.

### **Friday, June 25, 1954**

- 9:30 Business Meeting. Midwest Federation Delegates.....Walker Hall
- 11:00 Archeology Section Meeting—*George Malott*.....Room A  
 "The Old Copper Culture" (illustrated)—Dr. Robert E. Ritzenthaler, Curator of Anthropology of the Milwaukee Public Museum.

— Luncheon —

- 1:30 Paleontology Section Meeting—*James O. Montague*.....Room A  
 "The Fascination of Fossils"—Dr. Katherine Greacen Nelson of Milwaukee-Downer College  
 "Silurian Fossils"—Elmer R. Nelson, Jr., Curator of Geology, Milwaukee Public Museum.
- 2:30 Geology Section Meeting—*Hazen T. Perry*.....Room A  
 Speaker: Dr. Waldo S. Glock, Head Geology Department, Macalester College, St. Paul, Minnesota.
- 3:30 Old Timers Meeting—*Frank L. Fleener*.....Room B

### **Saturday, June 26, 1954**

- 10:00 Business Meeting. Midwest Federation Delegates.....Walker Hall
- 12:30-2:30 Tour of City and Parks
- 3:30 Convention Auction: Held in Kilbourn Hall.
- 6:30 Banquet Meeting. Hotel Wisconsin

### **Sunday, June 27, 1954**

Field Trip to Lutz Quarry by way of Iron Ridge, Oshkosh.

## *Points of Interest in Milwaukee*

*By Dr. H. W. Kuhm, Publicity Chairman*

For the benefit of those visitors to the Midwest Convention who are desirous of learning more about the 1954 Convention City, we compile a list of interesting places that are worthy of a visit.

**MUSEUM AND LIBRARY BUILDING**—Included in the field trip schedule of the convention is a trip to the Public Museum on W. Wisconsin Avenue, between W. 8th and W. 9th Sts. This nationally renowned institution is somewhat disrupted at present as a huge addition is being made to the building. Eventually this will house only the library—(visit the Science Room!)—and the Museum will be housed in its own magnificent and purely functional building. (Just say: "Where's Elmer?")

**COLLEGES**—Ever since the early days when Milwaukee was known as the "German Athens on Lake Michigan," Milwaukee has been the home of noted institutions of learning. Those warranting a visit are Marquette University, whose buildings sprawl down W. Wisconsin Avenue, the University of Wisconsin in Milwaukee, adjacent to the Auditorium, Milwaukee-Downer College—(whose museum of paleontology is a convention field trip stop)—, nearby Wisconsin State College in Milwaukee, and Mount Mary College, on the far northwest side.

**COUNTY STADIUM** — (N. 46th St. south of W. Wisconsin Avenue)—a rash of directional signs from as far off as Chicago, La Crosse, or Oshkosh will guide you there!—The new \$6,000,000 Stadium

—"The Home of the Braves!"—Milwaukee's National league baseball team. Has over 40,000 seats, 4 bases, and parking space for over 10,000 autos. (We counted the wheels and divided by four!)

**MITCHELL PARK** (S. 27th and W. Pierce Sts.)—The sunken gardens and the botanical conservatory of Mitchell Park are nationally known, and floral shows are held the year round.

**WASHINGTON PARK** (W. Highland Blvd., and W. Vliet St.)—Site of the inspiring Emil Blatz Temple of Music featuring "Music Under the Stars," and also one of the nation's finest Zoological Gardens. Two new elephants, fresh in from India, are awaiting your visit.

**LAKE FRONT** — skirting Milwaukee's beautiful bay which has been compared to the Bay of Naples! From Grant Park and South Shore parks, on the far south side, one can follow Lake Drive northward to Jones Island, housing the docks, where ocean going vessels unload and take on their transoceanic cargoes. Adjacent is Maitland Air Field, the Lincoln Memorial Bridge and Juneau Park, with its wildlife lagoons, as full of "quacks" as a quarry. The four mile long drive along the lake shore then encompasses McKinley and Bradford beaches,—open to the public,—Lake Park, and the \$10,000,000 Infiltration Plant—Milwaukee's greatest mystery because it exists solely to purify *water* which no one in Milwaukee drinks anyway!

# The Earth Science Digest

A MAGAZINE DEVOTED TO THE EARTH SCIENCES

Volume 7

May-June, 1954

Number 6

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Communications for editorial consideration should be sent to the Editor, Ben Hur Wilson, 406 Grover Street, Joliet, Illinois

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# GIANT BEAVERS ONCE ROAMED THE MIDWEST

By Herbert W. Kuhm

A rare fossil, part of the left jaw bone of the giant beaver, which once roamed the region of the midwest was recently donated to the Milwaukee Public Museum by Mrs. Gerhardt O. Stack, whose father, the late Louis C. Allarding, found it in Lincoln Park, (Wisc.) about 40 years ago.

It is the only specimen of the animal ever found in Wisconsin, according to Elmer R. Nelson, curator of geology at the museum. He said other specimens of the giant beaver have been found as far west as Nebraska, as far south as Kentucky and as far north as Canada.



Mary Ann Grayson compares ancient and modern beaver jaws.

Milwaukee Journal Photo

## BEAVER OF PLEISTOCENE AGE

Pleistocene age beavers ranged from about six and a half to eight and a half feet long from the head to the tip of the tail. Beavers today are from two feet to two and a half feet long.

Nelson said the jaw given to the museum indicated that the animal was at least eight feet long.

"It was about as large as a small brown bear, and weighed approximately 250 pounds," he added. The average weight of the modern beaver is from 30 to 40 pounds.

The ice age started about a million years ago. The giant beavers lived in this area until three or four thousand years ago.

Tooth structure of the Pleistocene age beaver indicates that, like the modern beaver, it was a gnawing rodent that lived on foliage and bark.

## HAD LONG POINTED TAIL

However, Nelson said restoration drawings of the giant animal show that it had a heavily furred, fairly long and pointed tail, instead of the paddlelike tail the modern beaver uses to slap the water as a warning signal and to help it swim.

The giant beaver could have been an aquatic animal and built dams, or it could have been an upland animal, according to Nelson.

In the periods in which animals developed, he said, many forms became very large and were so highly specialized that they died out as the result of changes in climate and food supplies and competition from other animals.

## AQUAMARINE PAPERWEIGHT PRESENTED TO EISENHOWER

In a round about way we have heard that our President has more than a casual interest in minerals. Only recently he has received a gift, a 363 carat ( $2\frac{1}{3}$  Ounce) aquamarine paperweight.

The deep blue stone, according to the Chicago Tribune news service, is reported to be the most perfect stone of its size, in an emerald cut style. It is being sent to the President by a former Polish aviator in the British air force who, after the war, chose to remain in Brazil and try his chances as a



jeweler, rather than to return to his communist dominated native land.

The aquamarine will be taken to President Eisenhower by Eric Johnson, United States special envoy, and in as much as protocol aids have advised that the President can not gracefully accept it as a personal gift, the stone will probably remain in the White House at the close of his administration.

### ORIGIN OF SEA-WATER

In our March-April issue we mentioned an article on "The Origin of Sea-Water," by Dr. Herbert B. Nichols, of the U.S.G.S., published in our December 1950 issue of the Digest. Dr. Nichols now writes us to say that his article was in reality only a review of a much longer paper, prepared by Dr. William W. Rubey, which may be found complete in Bulletin G.S.A., Volume 62, pages 1111-1147, 1951. This paper will be of special value to anyone interested in "The Matter of Juvenile Waters."

### NEW WORD NEEDED

"Rockhounds deserve a better name than such. While perhaps not the noblest endeavor of mankind, the search for unusual rocks and minerals is certainly a better-than-average hobby. At any rate, it calls for the use of the feet and the brain. This in itself is a startling reversal of a 20th century trend which would make those two organs as necessary as a present day appendix.

"So the rockhounds, who do not bay at the moon, bite postmen, and in other ways make themselves obnoxious, deserve a more dignified name.

"'Geologist' is not quite accurate. Any better nominations?"

EDITOR'S NOTE: The above item taken from the editorial page of the Joliet (Ill.) Herald-News (April 26th, 1954) is indicative of the great interest that is continually being shown in the question of a suitable name for the members of the "rockologist" fraternity. Who will come up with an answer to this \$64.00 question?

### OUR NATIONAL PARK SERVICES

Without doubt, the primary purpose of all Governmental Agencies, is to serve the people. Most agency administrators recognize this, and the quality of service rendered is truly commendable.

While some of these efforts may be of a long range character, and for the moment appear to be a bit intangible, there are others which are immediate and real. Few are fully aware of all of the many important services which are at our disposal for the mere asking, and therefore do not take advantage of the help which is available to them. This is particularly true of our National Park Service.

If you have a problem, or perhaps are planning a trip, first secure and look carefully over the literature which may be obtained by writing the National Park Service, most of which is free. Many persons have the unfortunate experience of passing right by, or within a few miles of some very notable feature, perhaps not even knowing of its existence, and then regretting it the remainder of their lives, simply because they have not taken the time necessary to inform themselves in advance concerning the details of their contemplated trip.

N. B. National Park Service, U. S. Department of Interior, Washington, D. C.

### OUR COVER PHOTO

We are indebted to the Santa Fe Railway for our excellent cover photo, showing this expert Zuni craftsman deftly forming distinctive necklaces, bracelets and other beautiful articles of jewelry connected with his art. Their work is always of unusual interest to those who are touring the great southwest.

This picture really "speaks ten thousand words" and so well illustrates the fact that genuine artisans need have but few tools and equipment to do things which others might not be able to accomplish with the help of a roomful of the most modern machinery.



# TRIPLE DIVIDE PEAK

by Edwin Goff Cooke

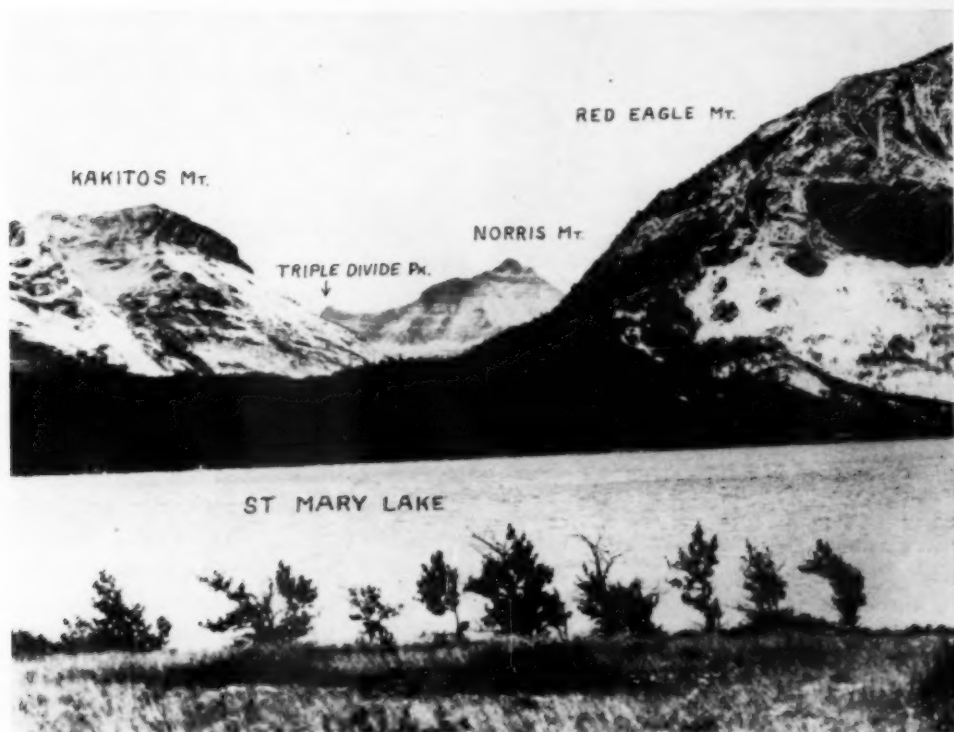
In order that the reader may better understand and appreciate the importance of Triple Divide Peak, a short digest of its geographic location and geologic background is, herewith, presented as an introduction.

The seldom recognized Peak is located in the southeastern part of Glacier National Park whose boundaries encompass an area of 1,538 square miles of spectacular mountain scenery and glaciers in northwestern Montana. For the more exacting reader its survey position is approximately  $113^{\circ} 32'$  west longitude,  $48^{\circ} 34'$  north parallel. On a clear day it can be viewed to best advantage by looking southward across upper St. Mary Lake at Hudson Divide Point 4.3 miles from St. Mary Checking Station, on the Going to the Sun Highway,

between St. Mary Chalet and Roes Creek Campground.

Relatively and contrasted with the majority of the majestic peaks in the area, Divide Peak is a low altitude point on the Continental Divide. It rises to an elevation of 8,001 feet at the end of a narrow spur that extends eastward from Norris Mountain the elevation of which is 8,876 feet.

The sedimentary rock stratas of the Peak and other summits in the Lewis Range, an eastern frontal segment of the Rocky Mountain System, are referred to as the Belt Series, (Algonkian). They were laid down, muds and sands, as sediments in an inland sea that once covered the great geosyncline that extended southward from the Arctic Ocean to probably Arizona and Southern California. As a group they are



Looking across St. Mary's Lake on going to Sun Highway.  
Photo: Glacier National Park Service.

divided on the basis of lithologic differences into six distinct formations. Named in order of their deposition they are known as, Altyn, Appekunny, Grinnell, Siyeh, Shepard and Kintla. In Glacier National Park the aforementioned rocks, whose maximum thickness is more than 20,000 feet, are in the form of a large syncline (down-fold), the east and west edges of which are, respectively, the Lewis and Livingstone Ranges.



**Author Edwin Goff Cooke  
Shoots Triple Divide Peak**

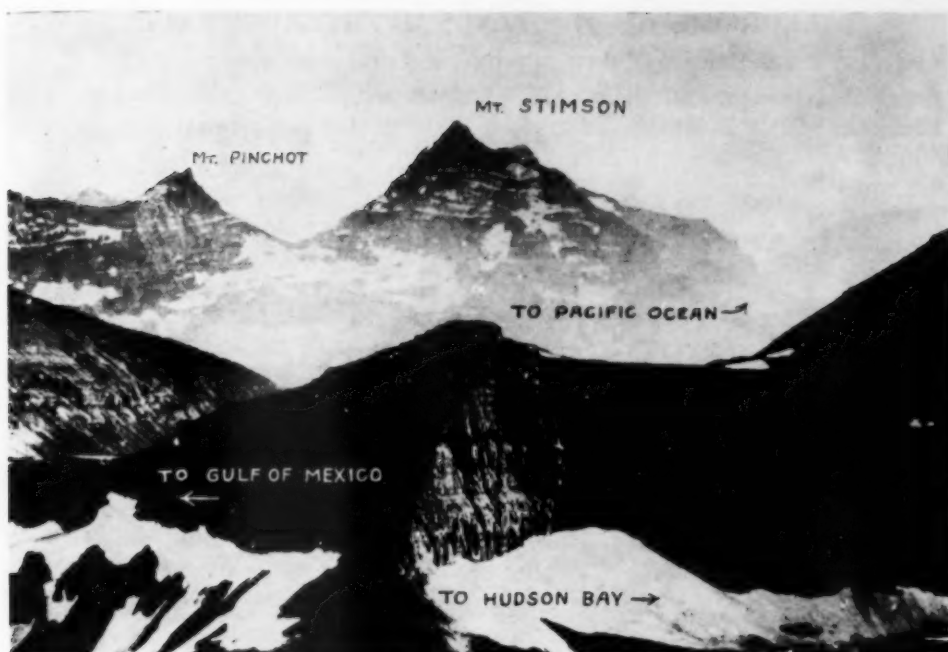
Each named strata of the Formation (Belt Series) presents interesting and important evidence that characterizes their various ages and the existing conditions under which they were formed. Mud cracks, ripple and current marks, raindrop impressions and the thick beds of fossil algae (genus *Collenia*) averaging 60 feet thick determine that the original sediments were deposited in a shallow and sometimes almost dry sea the area of which was being slowly depressed during Proterozoic times. Toward the end of the Proterozoic Era the sea gradually receded as the area was slowly uplifted. No doubt, other

younger Belt sediments had been deposited before the final uplift. However, much of such evidence has since been removed by various forces of erosion. Whether or not, the sea returned to within the area and received more sediments during the Paleozoic era has not as yet been determined for no trace of such rocks has been found within the boundaries of Glacier Park. Presumably, such was the case and Paleozoic strata once did overlay the older Algonkian formation now exposed there, for mountains to the South of the Lewis Range are composed of the younger Paleozoic Rocks which contain trilobites of several kinds. Unfortunately, erosion has obscured the several hundred million years of geologic history that followed the Proterozoic Era in the Park area.

Evidence in the vicinity does establish the fact that the area was again depressed during Cretaceous Times, that the sea returned and great thicknesses of various sediments were again deposited in the geosyncline. Those sediments formed the Cretaceous shales and sandstones that underlay the plains and prairies immediately east of the mountains. The Upper Cretaceous formations in the west are grouped and named as being Laramie, Montana, Colorado and Dakota.

It was sometime during the late Cretaceous, 58,000,000 years ago when tremendous crustal forces were forming a number of mountains on other continents that the western part of North America from Alaska to Mexico was being affected by a great west to east crustal thrust movement that gradually elevated the geosyncline for the last time and transformed the former inland sea into a mountainous region. It was then that the Rocky Mountains, (Laramide) were formed.

For several million years, the pressure from the west continued in the Glacier Park area eventually forming a great anticline with an eastern fold. Continued pressure, stress and strain caused the frontal fold to break along a north to south low



**The culmination of continued drainage as seen from Mount James.  
Photo: Glacier National Park Service.**

angle fault, and a great block of the crust was elevated and slid eastward over the younger, softer and greasy shales of the Cretaceous formations. When the movement finally subsided the rock order of the area was in reverse, the older ones on top, the younger underneath. That is why the Livingstone and Lewis Ranges are referred to as the mountains without any roots. The regionally known Lewis overthrust is thought to have occurred during the Eocene Period.

Triple Divide Peak is composed of those older Proterozoic rocks that were uplifted and shoved eastward in the overthrust. Like the towering peaks that surround and almost obscure it from view, it too has no roots. Despite its inconspicuousness, it, nevertheless, has an individual importance that cannot be ascribed to any other peak in North America. It has the distinction of being the culmination of continental drainage. Situated on the continental divide, the Hudson Divide ends at its summit. From

the triple sided glacier cut apex waters drain into three oceans, the Pacific, Atlantic and Arctic Oceans, that is, if Hudson Bay is considered to be an arm of the Arctic waters.

The three creeks most immediate to the base of Divide Peak are Hudson Bay Creek that joins Red Eagle Creek in the Red Eagle Valley, Atlantic Creek that merges with Cut Bank Creek in Cut Bank Valley and Pacific Creek that flows into Nyack Creek in a valley of the same name.

Waters from rain, melting snow and ice on the northeastern face of Triple Divide Peak shed into Hudson Creek and start their long journey northward to the Arctic via Red Eagle Creek and St. Mary River into Canada where they merge with the flowage of the Oldman River which converges with the northern waters of the Bow River at Grand Fork in southern Alberta to form the headwaters of the eastward flowing South Saskatchewan River. In the Province of Saskatchewan the south and

## DIAGRAMS OF THE LEWIS OVERTHRUST FAULT

Showing Typical Structure of Triple Peak Region.

Reproduced from Special Bulletin No. 1, Motorist's Guide to the Going-to-the-Sun Highway, by M. E. Beatty, Chief Park Naturalist. Published by Glacier Natural History Association.

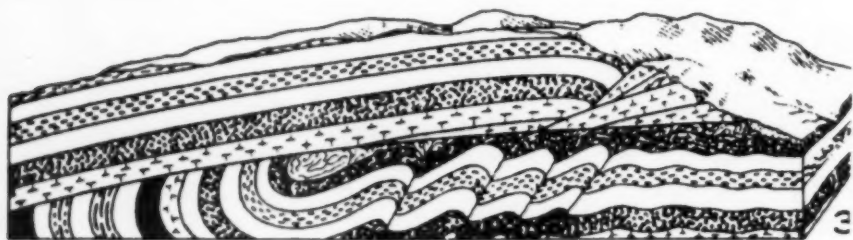


FIG. 1—FOLDING DUE TO HORIZONTAL COMPRESSION.

FIG. 2—FOLD HAS DEVELOPED INTO A THRUST FAULT.

FIG. 3—THE THRUST REACHES ITS MAXIMUM EXTENT, OVERRIDING THE YOUNGER ROCKS OF THE GREAT PLAINS.

FIG. 4—EROSION REDUCES THE THRUST MASS LEAVING ISOLATED REMNANTS OF THE OLDER ROCKS.

north branches of the Saskatchewan join and become the Saskatchewan River which empties into the northern end of Lake Winnipeg that in turn is drained by the Nelson River into the western side of Hudson Bay.

Similar waters that descend from the western slopes of the Peak drain into Pacific Creek a feeder of Nyack Creek one of the numerous tributary streams of the Flat-head River. Through the latter, the waters join the waters of the Middle Fork of the Columbia River and thence they flow to the Pacific Ocean.

Drainage of the southeastern side is carried by Atlantic Creek to Cut Bank Creek the waters of which flow eastward to the Two Medicine River that joins the Marias River a principal tributary to the Missouri. Eventually, the eastern divide waters that have reached the Missouri River reach the Gulf and the Atlantic Ocean through the

mighty Mississippi that carries the waters of the Great Basin.

Truly, it is remarkable that such a small elevation, that is seldom seen or recognized by so many, contributes waters to such far away places.

While the Peak cannot be approached by road or vehicle it can be reached by either of two foot trails one of which is from Cut Bank Chalet to Red Eagle Lake. The trail, number 102, leads up picturesque and wooded Cut Bank Valley to trail 104, which bears to the right up Atlantic Creek. The other, a trail that starts at Two Medicine Lake and ends at Cut Bank Creek trail. Explicit information and maps of the trails should be acquired from Glacier Park Ranger personnel.

The steep western face of the Peak can be climbed but it is inadvisable to do so as the descent is perilous and hazardous. Only the most competent and knowledgeable in mountaineering should attempt it.

#### (ACKNOWLEDGEMENT)

The writer is deeply indebted to Dr. George C. Ruhle for much of the information compiled by him while Park Naturalist of Glacier National Park, and printed in the "Guide to Glacier National Park"; likewise, to James L. Dyson, Head, Department of Geology and Geography, Lafayette College and author of special bulletin No. 3, "The Geologic Story of Glacier National Park"; also, to Marius R. Campbell, Geologist, United States Geological Survey, author of "Origin of Scenic Features of the Glacier National Park," 1921 edition; further, the writer expresses his appreciation for the cooperation and help tendered him in the gathering of data to M. E. Beatty, Chief Park Naturalist, Glacier National Park, and to Mr. Fred Parker, Executive Secretary, National Parks Association. Credit, is also expressed to the Executive Secretary of the Glacier National History Association who supplied many of the papers and books upon which the writer has leaned heavily.

EDWIN GOFF COOKE

### SYNTHETISCHE BARNSTEEN

Sedert de laatste oorlog, is de gehele streek der Baltische zee, waarin natuurlijke barnsteen gevonden werd, in de handen der Russen. Zij voeren echter geen barnsteen meer uit naar het Westen.

In West-Duitsland werd echter een "ersatz" uitgewerkt, uit kunsthar, dat de grootste gelijkenis met echte barnsteen vertoont en, net als deze, ook geëlectriseerd kan worden.

Dit nieuwe produkt wordt voornamelijk verwerkt in de juweelfabrieken van Neu-Gablonz. Zijn prijs is tienmaal lager dan die van echte barnsteen.

If you did not follow what is said precisely, here is what it means:

#### Synthetic Amber

Since the late war the shores of the Baltic sea, where amber occurs naturally, have

been in the hands of the Russians, who no longer export it to the West.

In West Germany a synthetic resin has been worked out which has the greatest likeness to natural amber, and like it, can be electrified.

This new product is produced in the jewelry factories in New Gablonz. The price is ten times lower than that of natural amber.

(Technica)

ERRATA: Ye Editor assumes responsibility for a rather crude error which crept into our March-April issue of the Digest. Inadvertently our issue number remained unchanged as No. 4 (same as the January issue), and not No. 5 which is correct. Since few subscribers have called our attention to the oversight, we can assume that no great harm was done.

B. H. W.



# UNIQUE INDIAN JEWELRY MADE IN SOUTHWEST

## SILVER CRAFTSMANSHIP VARIES WITH TRIBES

by Russell MacFall

Visitors to the American southwest will find that one of the most characteristic as well as beautiful craft products available there is the silver jewelry made by several tribes of Indians living in New Mexico and Arizona. Although made in relatively small quantities and by hand, this jewelry plays an important part in the economic life of these tribes. It has been imitated, but the genuine jewelry, which has authentic design and good workmanship, may best be obtained from reliable dealers in the southwest.

The bracelets, earrings, necklaces, concho belts, rings, brooches, and other ornaments the visitor will see in some profusion fall into three style groups, according to the makers. The Navajos, living in north-

eastern Arizona, learned their craft from the Mexicans, and their jewelry is generally simple, massive, and if set with turquoise, uses one or a few large stones in the piece. The Zunis, whose pueblos are about 50 miles south of Gallup, New Mexico, are reputed to have learned the craft in 1877 from a Navajo, Alsidi Chon, who had been a prisoner of the United States at Fort Sumter, New Mexico. He taught a Zuni, Lanyade, then went away, and Lanyade developed the art and taught it to his people.

### *Zunis Are Retiring People*

Today silver working and gem stone cutting are the principal occupations of the 3,000 tribes-men in the three Zuni villages. Some of the workers are sup-



*Attractive Hopi jewelry is fashioned by this expert Hopi craftsman.  
Santa Fe Railroad Photo.*





**Hopi silversmith deftly bends strip of silver into a ring as Navajo craftsman (Right) inspects his own handiwork. Santa Fe Railroad Photo.**

plied with silver, turquoise, and orders by traders who market the jewelry, and others work for themselves, selling in Gallup or in other Indian villages. The Zunis are a retiring people, strongly religious, and they have become relatively prosperous thru their craftsmanship, owning houses, trucks and power tools.

Zuni jewelry employs rows or groups of small pieces of turquoise set in geometric patterns. The turquoise is delicately cut and often almost hides the silver in which it is set. Channel pieces, in which turquoise is set in channels in the silver and then both are ground to an even surface, are distinctively Zuni. So is the inlay combining abalone shell, turquoise, coral, and jet in elaborate pins. Zuni earrings, for example, are usually intricately fashioned with tiny stones and silver dangles, while Navajo earrings are single

pieces of turquoise drilled for a wire to hold them on the ear, or are made up of strings of turquoise disks.

### ***Hopi Designs Distinctive***

The Hopi tribe, which lives near the Navajos in Arizona, was prejudiced against silver jewelry because the Spaniards, whom they resisted while subjugated by the invaders, used it to bribe tribesmen. When this prejudice died out, they had no money to get silver and turquoise and tools, but in 1946 the federal Indian service set up a silvercraft school at the Hopi High school at Oraibi, Arizona, under the GI bill of rights program. Under the direction of gifted Hopi artists, the tribal designs have been used as motifs, and a high degree of craftsmanship has been developed. Hopi jewelry uses turquoise sparingly as accent and is characterized by distinctive design wrought in the silver. Pieces are marked

with the sunshield and clan sign on the back.

The oldest pieces of Indian jewelry are of plain silver and usually heavy and simply wrought. These pieces, as well as the more modern ones, play an important part in the life of the Indians, who, like the orientals wear their wealth in this form. Often the bride is bought for a fine necklace or other prized object; the medicine man takes this pay in a ring or concho belt, and jewelry is pawned with the trader to get ready money.

### **NEW MINERAL SPECIES HONORS NAVAJO TRIBE**

A new vanadium mineral previously unknown to science has been found at Monument No. 2 mine in northeastern Arizona and named "Navajoite" in honor of the Navajo Indians on whose reservation the mine is located, the Geological Survey announced recently.

Navajoite is a dark brown, fibrous mineral composed of hydrated vanadium oxide. Although it has a high vanadium content it is not considered a good vanadium ore mineral because it does not occur in large enough quantity. A description has been prepared by Alice D. Weeks, Mary E. Thompson, and Alexander M. Sherwood for publication in "Science."

Because there are only about 1,600 well-defined species of minerals compared with millions of known plant and animal species, the discovery is an event of considerable moment in the mineralogical world. Specimens will be sent to the National Museum where the Nation's master collection of minerals is kept.

Vanadium is one of the rarer metals, and occurs with radium and uranium. It is the commonest of the group and is not radioactive. Silvery-white in its metallic form, it is mostly used as an alloy in steel to impart great hardness.

The Minerals Yearbook of the Bureau of Mines shows that 90 percent of the vanadium used in the United States goes into ferrovanadium for the manufacture of

tool steels, engineering steels, high-strength structural steels, nonaging rimming steels, and special wear-resistant cast irons.

The Colorado-Utah region is the center of domestic vanadium-ore mining in the United States with small production also by Arizona, Nevada, and New Mexico.

### **ANSWER TO PRIZE QUESTION FOR MARCH**

Credit for answering our "Prize Question for March" goes to Mrs. Julian Wetherbee of Keene, New Hampshire whose subscription to the Earth Science Digest will be advanced one year.

Our "Horatio Alger Boy" mentioned in the question, according to Mrs. Wetherbee was none other than the late Senator William A. Clark, the "Copper King" of Montana, who was born on January the 8th, 1839, in Fayette County Pennsylvania, from whence he removed with his family to an Iowa farm in Van Buren County, in 1856.

Soon, thereafter he entered Iowa Wesleyan University (now College) as a student in 1860. Upon the outbreak of the "War Between the States" he withdrew from school and moved to Colorado, and on to Montana in 1863, where he "washed" \$1,500 in gold at Horse Prairie Creek.

Following his accidental discovery of copper ore in the vicinity, he built the Old Dexter Stamp Mill near Butte, and established the Colorado and Montana Smelting Company, the antecedent of the present great Anaconda Copper Company. This was the beginning of one of the most fabulous financial careers of the nineteenth century.

Later in life he removed to New York City, where on 5th Avenue he established an Art Gallery in his home which was valued at more than five million dollars, and afterwards became known as "Clark's Folly." When he died on March 2nd, 1925, he was considered to be one of the world's wealthiest men.

# ARCHEOLOGY—Amateur and Professional

## Indications of Indian Occupation

One of a Series of Articles, by George A. Malott

The location of Indian village and campsites in the Eastern United States is greatly facilitated by taking into consideration several limiting factors. One was the mode of travel of the prehistoric Indian. Before white contact he had no knowledge of the wheel, and his only domesticated animal was the dog, which he used to a limited extent as a beast of burden. His transportation was limited to canoe, boat and raft or travel by foot. Thus it can be readily seen that it would be impossible to travel or transport materials overland for any great distance. Therefore practically all of the Indian occupation sites were located on waterways. As a general rule, sites are located on river terraces above flood level and usually on a well drained rise or gravel bar. On many streams there are high bluffs or rock overhangs which were used to a large extent since they afforded shelter from the elements. Prior to white occupation practically all of the United States east of

the Mississippi was forested except for an occasional open park or meadow. Since the streams did not fail in the summer as they do now they not only provided travel ways but a ready source of food as well. It was possible to depend on them for fish and mussels, and small game and deer frequented the valleys.

The American Indian was an accomplished worker in wood and bark, and his bark or dugout canoes enabled him to travel and transport materials from place to place. That he traveled and traded extensively can be shown by the finding of Gulf of Mexico and Atlantic Coast marine shells in the Ohio and upper Mississippi River valleys. Native copper from the Keweenaw peninsula and obsidian from the western states are found in these same locations and also in the lower Mississippi valley. Grizzly Bear teeth have been found over large areas of the Ohio and Mississippi valleys yet they could only have been obtained from the



*Indian burial grounds showing three typical mounds.*



**Effigy Mounds. The Great Serpent Mound of Ohio.**

western states. Galena and native copper have been found in many sites on the Florida Gulf coast. The galena could only have come from locations in southeast Missouri, the Illinois, Iowa, Wisconsin area and the Tristate area of Missouri, Kansas and Oklahoma. While the only source of the copper was the Keweenaw peninsula of Michigan. Mica from the Virginias and the Carolinas has been found thruout the Ohio and Mississippi valleys and all along the Gulf coast to southern Florida.

Another factor limiting the Indian to the river valleys may be found in his agricultural tools. His agriculture was very primitive, depending on the easily tilled soils of the flood plains. Having no plows or tractors, he used a digging stick or hoe made of wood, bone or stone to cultivate his crops. It was much easier to use these tools on the river bottoms than to break the tough sod.

The surest evidence of permanent occupation is the finding of pottery fragments or sherds on the surface of the ground. Pottery being rather bulky and fragile as well

as easily made, was not moved from place to place as were the lithic tools or weapons. While the finding of flint chips or spalls might indicate a village or camp site, on the other hand they might only indicate a work shop or preparation spot for the rough blanking of tools or weapons. A great many times these lithic remains are concentrated far from a stream of water and rightly so because it was a great deal easier to carry a partially finished object than a block of raw material. If wood or bone artifacts are found they are usually comparatively recent because the wet humid climate of the eastern United States caused their rapid decay. Occasionally due to soil conditions such as extreme dryness, metallic salts or alkalinity, these objects and other artifacts woven of fiber bark or hair were preserved.

Other indications of permanent occupation are shell middens or refuse heaps found along river bottoms. These are sometimes called shell mounds. They were the result of countless years of using the mussels for food and the discarding of the

shell where the food was eaten. In some cases these mounds were very large, as long as a thousand feet and as wide as three hundred feet and sometimes as deep as twenty five feet. Of course most of the shell middens did not reach this size, only very long occupation and a large population with a good supply of mussels could build a mound this large.

Mounds are of course another positive indication of Indian occupation. There are several different types depending on their use. Occupation mounds are the result of an unintentional accumulation of debris by the Indians. These mounds are sometimes as much as three feet high, but then again they may not have over a two or three inch rise due to long erosion or cultivation. This type is not readily discernible at the present time and is apt to be overlooked by the amateur. In a great many cases the only indication is a change in color or texture of the soil, which often may be more readily recognized from the air. Mounds used for burial purposes were not usually located in the village proper but on a hill or bluff close by. In some cultures they contained pottery which differed from the ordinary type used in the every day life of the Indian. Therefore, examination of burial mound artifacts, while of immense value in depicting one phase of Indian customs, does not show how they actually lived. Some of the burial mounds contain only one burial while others may contain hundreds. This depends on the culture of the Indians who made the mounds. As far as artifacts are concerned the same thing holds true, some have very many artifacts while others have very few or perhaps none.

The ceremonial mounds are large structures usually located in the village proper and are for the most part sterile. That is they do not as a general rule contain either burials or artifacts. They were used as the foundation of a temple or place of worship. Another type of ceremonial mound was the effigy mound made in the likeness of various birds, animals or reptiles. The purpose and use of the effigy mound is not very well known but it is assumed they are partly expressions of the religious symbolism of the Indian.

There are in some places large earth-work enclosures often referred to as forts. These embankments may be in the form of various geometrical figures such as squares, rectangles or circles, and may be constructed of earth or stone. They may enclose areas of as much as two hundred acres and many times there are several mounds enclosed in them. Archeological evidence of recent years indicate that they are of a ceremonial nature rather than forts.

In succeeding articles we will tell how to survey and record the location of Indian occupation sites and how to catalogue and interpret the various artifacts founds.

### CELESTIAL SHOW

As an added post-convention field trip for the Milwaukee Convention, Dame Nature is putting on for us one of the grandest shows of all time. A total eclipse of the sun will occur on June 30th, passing across the northern border of Wisconsin, which will give our visitors a chance to witness a phenomenon which will not occur again in this region in their lifetime or in that of anyone now living. Plans will be made for those who desire to see it.

### EARTH SCIENCE QUIZ NO. 12

TEST YOUR KNOWLEDGE! How much do you know? How many of the following terms can you define? They are arranged in three groups with progressive difficulty. Group 1, things everybody should know; group 2, things good "rock-hounds" should know; group 3, things which experts might be expected to know. Try your luck. To score—add up total points as indicated by the group number and rate as follows: 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect. Answers Page 19.

a.—(1) chalcedony

b.—(1) basalt

c.—(1) fossil

d.—(1) dome (geology)

e.—(1) loam

f.—(1) chrysocolla

g.—(2) cretaceous (rock)

h.—(2) porphyry

i.—(2) loadstone

j.—(3) monadnock

k.—(3) tripoli

l.—(3) specularite



# ORDOVICIAN TRILOBITA

Second of a Series By James O. Montague  
Honorary Curator of Geology Milwaukee Public Museum

The transition period between the Cambrian and the Ordovician showed very little violent emergence of land from the Cambrian seas. The land did not rise to any great height during the change, consequently there was a minimum amount of erosion. The Cambrian seas were surely but slowly forced back into the deep oceanic waters. The climate was sub-tropical and continued so through the 67 million years of the Ordovician period.

A greater portion of the North American continent was submerged at some time during the Ordovician period. Much of it may have been just a few feet above sea level and subject to frequent changes. In all probability there was heavy precipitation during the period as is usual in sub-tropical climates.

There is no evidence that any form of land life, either plant or animal, existed during the Ordovician period. The highest form of marine plant life consisted of seaweed and coralline algae.

The evolution of invertebrate life was much greater in the Ordovician than in the Cambrian period. The trilobites appeared in much greater numbers and with many decided changes in appearance. According to Twenhofel and Schrock there was at least 125 genera and 1200 species of Ordovician trilobites. From this culmination the decline started.

## Changes Appear

The spinose genera was greatly changed in appearance. In most instances the genal spines were greatly shortened or disappeared entirely along with the thoracic and plurae spines. There was a great increase in smooth genera. This change may have been due to the fact that spinose trilobites could not curl as readily for protection consequently became easy prey for their enemies. Many curled specimens are found in Ordovician rocks.

We will call your attention to the peculiarities of a few Ordovician trilobites:

*Cryptolithus tessellatus*, Green, is odd in appearance in that there is a broad cephalic brim, steeply inclined and deeply pitted, around the high glabella; thorax of six short segments; pygidium short, wide, with sharply deflected rim. The genal spines extend backward twice the length of the thorax and the pygidium.

*Cryptolithus bellulus*, Ulrich, is just as odd in that it had a broad cephalic brim surrounding the glabella but lacked the genal spines. The thorax and pygidium were short with about half the width of the cephalon.



*Dalmanitina socialis* (Barrande) Ordovician—Bohemia. "Milwaukee Public Museum Photo."

*Ceraurus pleurexanthemus*, Green, was apinose, with a wide semi circular cephalon and strongly convex glabella; genal spines on the fixed cheeks; at some distance from the glabella; eleven thoracic segments with pleura terminating in short spines; a small pygidium with one pair of long spines.

*Scutellum lunatum*, Billings, had a semi-circular cephalon shorter than the pygidium; low glabella with slightly grooved furrows; free cheeks extending backward to middle of thorax; eyes on free cheek almost to rear of glabella; ten thoracic segments; pygidium large marked with six short ribs radiating in fan shape from each side of a short axial lobe.



*Triathus becki*, Green, is the most interesting of all Ordovician trilobites. Before its discovery in the Utica Slate near Rome, New York, nearly all the exact knowledge of the ventral surface of the trilobites and their appendages was derived from the sectioning of enrolled specimens. This discovery revealed both the dorsal and ventral sides of this specie in great detail, and these structures may be taken to be mainly typical of all trilobites. It is rather difficult to present a good description without the aid of photographs. However, all up to date works on paleontology have good illustrations and should be studied to get a clear idea of its appearance.



*Flexicalymene seraria* (Conrad) M. Ordovician — New York. "Milwaukee Public Museum Photo."

The ventral side of the cephalon had a pair of antennae extending forward some distance beyond the brim, also four pairs of appendages on the cephalon. Each thoracic and pygidium segments had a pair of appendages, which were jointed and more or less leaf like, carrying tufts of setae and could be used for either crawling or swimming. They were also used to carry food to the mouth.

*Isotelus* is another interesting Ordovician genera. *Isotelus gigas*, Deakay, had an elongated cephalon and pygidium, the cephalon was without genal spines.

*Isotelus iowensis*, Owen, was similar to *I. gigas* but with genal spines. *Isotelus brachycephalus*, Foerste, differed from *I. gigas* in having genal spines and wide rounded, instead of sub triangular, shields. *Isotelus maximus*, Locke, was the largest known American trilobite. It attained a

length of almost twenty four inches.

*Flexicalymene senaria*, Conrad, had a narrow shovel shaped brim; pygidial ribs grooved to margin. The picture illustrates the animal in a rolled form. This genera is the fore runner of the Silurian Calymene.

*Dalmanitina socialis*, Barrande, the accompanying picture is of the cephalon of a Bohemian specimen. We will also meet some of its descendants in the Silurian.

*Bumastus trentonensis*, Emmons, had a large smooth semi-circular cephalon with a well rounded glabella; wide between the eyes that were set well back on the cheeks; ten thoracic segments with very slight axial furrows; large smooth ovate pygidium. The bumastus family became quite large in the Silurian.

### Competition Arrives

As in all other forms of dominating life some other form arose to challenge the supremacy of the trilobites. The Ordovician seas were favorable to the growth and development of all marine life, particularly the giant cephalopods, which in some specie grew to a length of fifteen feet. The helpless rolled trilobite was easily grabbed by the long tentacles of the cephalopod and held until it unrolled or was crushed by pressure.

As the Ordovician period drew to a close so did the trilobites start their decline. We will meet them again in the Silurian where they will be just as interesting.

### FROM UNDER THE SEA

While it is not uncommon now to hear of oil and sometimes other minerals being recovered from beneath the ocean floor, yet it always startles one's imagination when he hears of mining operations being carried on far beyond the shore line.

It is well known that in many places in England, coal is mined off shore, but nowhere along the coast of the United States is such opportunity afforded. However at Glace Bay, Nova Scotia, coal mine tunnels extend more than a half mile beneath the ocean, and only recently two miners lost their lives in a disastrous fire in one of these mines caused by a dynamite blast.

## OBITUARIES

### Edgar H. Sarles

Edgar H. Sarles was born on August 1, 1878, in Brooklyn, New York; The son of a Baptist Minister, and departed this life January 13, 1954.

Mr. Sarles, who spent many years as a resident of Cincinnati, Ohio, lived his early life in a village in New Jersey. Here he obtained his early schooling in public and private schools. Then after five years in a college preparatory, he attended and graduated from Rutgers College in 1899, with a B.S. in Chemistry.

His interest in mineralogy and earth sciences started at an early age, with many trips on foot and on bicycle to famous New Jersey locations, furnishing the beginnings of sixty years of collecting and study. At the age of 12 he built a fine large mineral cabinet to house his collection, which endures as a tribute to his industry to this day.

Among his early achievements as a collector and student were his discovery of metallic silver in New Jersey, a new species of trilobite in the Devonian Rocks of New York state, and later the discovery of a significant deposit of Bauxite in Southern Ohio.

Edgar H. Sarles, the man, was without equal, in the opinion of his friends, who numbered in the thousands throughout the world. He gave freely his time, his knowledge and efforts to everyone in a fashion to deprive himself of many things. His first consideration was always the needs and problems of his friends.

In Cincinnati thru his leadership, knowledge and perseverance, there developed a group of amateur geologists and mineralogists, which culminated in two organizations; "The Dry Dredgers" and "The Cincinnati Mineral Society". His library consisting of some thousand texts and

bulletins are a tribute to his insatiable desire for finding out the how and why of the innumerable phases of the earth sciences.

Mr. Sarles is survived by his widow Mrs. Minnie Sarles, two daughters, Mrs. Fred Schatz, Mrs. Ruth Benedict and a son Mr. Wesley Sarles.

Charles L. Gschwind

### Junius John Hayes

The many friends and associates of Junius J. Hayes, Professor Emeritus at the University of Utah were deeply shocked on learning of his death, at the age of 68, on February 27th, last. The immediate cause of his death was a heart attack which occurred while driving his automobile on U. S. Highway 160, near Moab Airport.

Since retiring from his faculty position, several years ago Professor Hayes has been engaged in Civil Engineering work. He had served as President of the Mineralogical Society of Utah from 1940-49 and in 1947 he was President of the newly created Rocky Mountain Federation of Mineralogical Societies. He was also past-president of the American Federation.

The former university teacher was a member of the Wasatch Gem Society and a former president of the Astronomical Society of Utah. He also held membership in the Utah Academy of Sciences, Art and Letters and Utah Audubon Society.

He was a native of Pleasant Grove, Utah, being born on October 2, 1885. He was graduated from Brigham Young University in 1907, and attended the University of Chicago in 1934. He was a member of the Mormon Church, and on August 28, 1912 he married Genevieve Spilsbury, in the Salt Lake Temple. He is survived, in addition to his widow, by five sons and one daughter.

Junius Hayes will long be remembered by all who were privileged to know him as a kindly, scholarly gentleman, who was loved by all, and as a man who had a great capacity for work, making friends, and for doing good. Being long active in scouting, he practiced its principle of doing someone a good turn daily, as a most natural part of the art of good living.

Ben Hur Wilson

### LET'S PLAY THE GAME!!

*Program Chairmen Attention:* Do all your programs tend to follow one set pattern month after month? Do they sometimes seem to be monotonous? If they do, then why not vary the menu occasionally. Have an "EARTH SCIENCE QUIZ" either before or at the close of the meeting, and give a mineral prize to those who have the highest or a perfect score. How? Well here's how!

Take any one, or a combination of our Earth Science Quizzes if a longer list is desired, and mimeograph the names in the questions in a single column down the page. Below, mimeograph the answers numbered and in a scrambled order, with a line across the bottom of the page for the name and the score. When ready pass out these sheets with instructions that they are to match the answer numbers with the correct name at the top, allowing—say five minutes to do the job, then collect and

correct. From 20 to 25 question names will seem to be about the best number.

For beginner groups use only 1 point numbers, and for more advanced members the 2 or the 3 point names may be used if it may seem desirable.

### FAMILIAR LANDMARK GONE

Many of our readers familiar with the romantic haunts of New England will regret to learn that fire of unknown origin completely destroyed the mammoth 87 year old Halfway House on the slope of Mount Monadnock on April 14th. The hotel, known to thousands throughout New England, had not been operated as a public house since it was condemned last year. A regrettable feature connected with the fire was the loss of the old guest books, which through the years had collected the names of so many of our great writers, artists, and other notables who had visited Halfway House during the summer time in the last century.

### WORLD'S LARGEST EMERALD

What is said to be the largest known emerald is at present owned by the Duke of Devonshire. Its weight is one thousand three hundred eighty-four carats. At prices currently quoted, around \$250.00 plus per carat, the market value of this stone must be upwards of a third of a million dollars. Are there any buyers? No! It is not for sale.

### ANSWERS: Test your knowledge. (Check the ones you have correct.)

- a.—(1) Chalcedony. A transparent or more generally translucent cryptocrystalline form of quartz.
- b.—(1) Basalt. A heavy, dark colored, black to dark brown, igneous rock of a dense texture.
- c.—(1) Fossil. Various physical evidence of forms of organic life of some previous geologic age.
- d.—(1) Dome. An uplift in which the beds dip outward in all directions from a center. Important feature in oil geology.
- e.—(1) Loam. An impure soil containing particles intermediate in size between those of clay and sand.
- f.—(1) Chrysocolla. A hydrous copper silicate. Usually green or blue-green.
- g.—(2) Cretaceous. Rock of the nature of chalk; relating to chalk. (Hitchcock). Also a geologic period.
- h.—(2) Porphyry. An igneous rock containing crystalline masses of great irregularity in size.
- i.—(2) Loadstone. A piece of magnetite possessing polarity like a magnetic needle.
- j.—(3) Monadnock. A type of mountain in glacial nomenclature indicating that the surrounding ice sheets did not entirely cover it.
- k.—(3) Tripoli. A highly siliceous sedimentary rock employed as fillers and abrasives. (Colloquial in Illinois)
- l.—(3) Specularite. An iron ore occurring in tabular crystals with splendid metallic lustre.

# "MEET ME IN MILWAUKEE— MIDWEST MECCA IN '54"

Dr. H. W. Kuhm, Publicity Chairman

The blue print for the 1954 Midwest Federation Convention, to be held in the Civic Auditorium at Milwaukee, Wisconsin, June 24-25-26, is near completion. Final preparations will be made at a joint meeting of directors and committee heads of the Midwest Federation and the Wisconsin Geological Society, convention host, scheduled to be held at the Hotel Wisconsin, Milwaukee, convention headquarters.

*Exhibits:* Commercial Exhibits Oliver W. Lex states that dealers from the east, midwest and west will have exhibits including gems and minerals; lapidary equipment and supplies; rare minerals; fluorescent minerals; cut stones and gem materials; diamond saws; unusual cutting materials; rare ores; books, slides and films of gems; slabs and mountings. Non-commercial Exhibits Chairman Gilbert J. Thill is lining up an impressive array of exhibits that will help to round out the Midwest show.

*Program:* Program Committee Chairman John Mihelcic is booking program commitments that assure a high grade of educational features that will make attendance a "must" for information-hungry rock-hounds, lapidarians, and fossil fans.

*Auction:* In keeping with the custom of past conventions, an Auction will be held on Saturday afternoon, June 26, from 3:30 to 5:30 in Kilbourn Hall. The Convention will be nearing its close and the Auction will not interfere with the dealer business in Juneau Hall. This is an Auction of donated materials—cut and polished material, minerals and fossils—the proceeds of which go into the fund to help defray the expenses of the Convention. James O. Montague, General Chairman of the Convention, requests that you be generous in your donation of material for this auction. Your local materials are generally highly prized by those who come from another

state. Please donate first class specimens only. Jim says it "is better to contribute one real good specimen than a half dozen mediocre ones."

*Souvenir Guide to Geological Sites:* Each registrant to the Convention will receive a Souvenir Guide to Noteworthy Geological Sites in Wisconsin, together with a directory of the Convention Field Trips:

- (1) Tour of the Department of Geology, Milwaukee Public Museum.
- (2) The Green Memorial Museum of Paleontology, Milwaukee-Downer College. Guide: Dr. Katherine Greacen Nelson, Museum Curator.
- (3) The Lutz Quarry, at Oshkosh. (Marcasite, pyrite, calcite, sphalerite). Hosts: Mr. and Mrs. Richard Lutz. Guides: Herman Hollub, President, Winnebago County Rock & Mineral Society, and Elmer Rowe Nelson, Curator of Geology, Milwaukee Public Museum.
- (4) If enough convention visitors desire, a motorcade will visit Milwaukee's parks and outstanding civic features Saturday morning.

*Trading Post:* Another Convention feature will be the Trading Post, where you may engage in a friendly bit of "hoss trading," swapping your surplus for someone else's so that both may profit thereby.

*WGS Welcome Mat is Out:* As Chairman Jim says, "Meet me in Milwaukee-Midwest Mecca in 1954. Come with a smile, a happy heart, and a determination to have the time of your life. We will smile right back, lean over backwards, and do our derndest to see that you get it!"

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List on Page 23



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## OUTSTANDING GEM SHOW

### By Central Illinois Rockhounds

May 1st and 2nd were the dates when the Central Illinois Rockhounds of Decatur, Illinois put on their second show at the Y.M.C.A. in Decatur. The affair was well attended, and the visitors were seen from as far away as Chicago. Surrounding towns, among which were Springfield, Bloomington and a good many others, were well represented in the exhibits.

Those exhibiting were Paul R. Wilson with gemstones, relics and artifacts; Frances E. Wilson of Millikin University, with gemstones and jewelry; Brice Kennedy with cut and polished gemstones and jewelry; Dorothy Kennedy with fossils; LaFayette Funk with petrified woods, minerals, fossils-snails and gemstones; E. O. Carter with precious and semi-precious stones, fossils and quartz; J. H. McCormick with rocks and minerals; Bernard W. Smith with agates and gemstones; George M. Davis with gemstones, minerals, geodes, fossils and sea shells; Mr. and Mrs. Leach with rocks and minerals; Mrs. L. E. Scott with equipment for pebble pups; Miss Helen Brundage with mounted jewelry; Mr. George B. Ferre with silver casting, jewelry and gemstones; Mr. William C. Wilder with rough stones, slabbed stones and gemstones; Mrs. Lois Heister with rocks, minerals and gemstones; Henry F. Weise with gemstones; Paul S. Smith with rocks, minerals and relics; Douglas Lawyer, rocks and minerals; William F. Farley, with fluorspar.

The show was under the able direction of the regular officers, Mr. George M. Davis, President, Mr. Brice Kennedy, Vice President, Mr. LaFayette Funk, Vice President, Miss Helen Brundage, Secretary, and Mr. Henry F. Wiese, Assistant Secretary.

This lively, well organized and well balanced club is to be congratulated on a splendid showing and an informative and interesting exhibit which no doubt will attract more people for a larger and bigger show next year. We extend our congratulations.

J. D. W.

## SEE THIS FINE EXHIBIT

At Weiser, Idaho, a permanent exhibition of collectors' (rockhounds) minerals and gems has been set up in the Washington Hotel lobby by the Chamber of Commerce and the Snake River Gem Club.

The Lower Valley, Hell's Canyon, and the Salmon River are publicised by gem hobby magazines as one of the nation's happiest hunting grounds for collectors.

Materials on display, and available in the region, include agates, petrified wood, garnets, sapphires, pan gold, ore samples such as copper, lead, silver and tungsten. Rockhounds visiting Idaho should by all means drop in and see this exhibit.

## GREAT GEM BOOK SERIES

Few items of intrinsic value have had a greater influence upon human history than Gem Stones through ages past. They have always been the subject of great interest to both young and old, and to rich and poor as well.

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We are indeed fortunate to be able to announce that beginning with our next issue, we are to have a series of articles contributed by Dr. J. Daniel Willems upon the Great Gem Books, from the time of Pliny the Elder, A.D. 70, who was perhaps the very earliest authentic writer upon this subject, on down to the present day.

No one will want to miss these very fine articles by Dr. Willems who is an eminent authority on gem literature, and who possesses in his own private library, one of the finest and most complete set of gem books now in private hands in this country. Be sure to look forward to these interesting articles starting in the July issue.



## Bring Your File Up to Date

Back numbers of the *Earth Science Digest* are still available. Some are in short supply and will soon be gone. If you like the Digest, you will find much to enjoy in previous issues. All numbers are 35 cents each, or 3 for \$1. **WANTED TO BUY**—Copies of *Earth Science Digest* for Aug., Sept., Oct., and Dec., 1946; March, June, Sept.-Oct. 1947; March and Aug., 1948; Jan., 1949; and March 1950. Write *Earth Science Digest*, Box 1357, Chicago 90, Illinois.

### 1946

November—Craters of the Moon National Monument, by H. N. Andrews, Jr. An Alaskan Gold Deposit, by Victor Shaw.

### 1947

January—Natural Steam Plant, by W. D. Keller. Alaska Gold Trails of '98, by Victor Shaw.  
February—Michigan Minerals, by Henry P. Zuidema. A Missouri Ebb and Flow Spring, by W. D. Keller.  
April—Famous Lost Mines, The Lost Dutchman, by Victor Shaw. Origin of Dolomite, by Kenneth J. Rogers.  
May—Famous Lost Mines, The Lost Pegleg Smith, by Victor Shaw. What Camera for the Earth Scientist, by W. D. Keller.  
July—Prospecting With a Geiger Counter. Famous Lost Mines, The Lost Dutch Oven, by Victor Shaw. Notes on Crinoid Research, by Harrell L. Strimple.  
August—Nebraska's Marsupial Tiger, by H. P. Zuidema. Lake Superior Agate, Part I, by T. C. Vanasse. Famous Lost Mines, The Lost Arch, by Victor Shaw.  
November—Zeolites for Lapidaries, by Richard M. Pearl. Famous Lost Mines, The Lost Tub, by Victor Shaw.  
December—What Happened to the Dinosaurs, by Russell C. Hussey. Famous Lost Mines, The Lost Papuan, by Victor Shaw.

### 1948

January-February—Pollen Grains Write History, by Stanley Cain. Famous Lost Mines, The Lost Gunsight, by Victor Shaw.  
April—Sir William Logan, Father of Canadian Geology, Part I, by E. J. Alcock. Geology and the Microscope, Part II, by Jerome Eisenberg.  
May—Fire Clay, by W. D. Keller. The Barite Group Minerals, by Richard M. Pearl. Sir William Logan, Part II.  
June—Colorado Mineral Localities, by Richard M. Pearl. The American Federation and Earth Science Expansion, by Ben Hur Wilson.  
July—Digging for Dinosaurs, by Horace G. Richards. How to Clean Mineral Specimens, by Mary Piper.  
September—Forms and Origin of Caves, Part I, by Charles E. Hendrix. Fulgurites, by E. Carl Sink. History of Fossil Collecting, Part II.  
October—Forms and Origin of Caves, Part II. Water Witches by W. W. Schidler. History of Fossil Collecting, Part III.  
November—Coal Age Flora of Northern Illinois, by Frank L. Fleener. How the Amateur Geologist Can Aid Science, by Gilbert O. Raasch.  
December—The Gros Ventre Landslide, Part I, by H. P. Zuidema.

### 1949

February—The Moonscar Upon the Earth, Part I, by Harald Kuehn. Staurolite in Georgia, by A. S. Furcron. Bryce Canyon National Park, by Roger L. Spitznas.  
March—The Moonscar Upon the Earth, Part II. The Geological Survey, by William E. Wrather.  
April—Surface Geology at the Border of an Ice Sheet, by C. W. Wolfe.  
May—Coal Geology, by Gilbert H. Cady.  
June—The Search for Uranium, Part I, by W. S. Spitznas. Petroliferous Geodes, by Roger L. Spitznas.  
July—Scenic Kansas, by Kenneth K. Landes. The Search for Uranium, Part II.  
August—Soil Erosion in Southern Russia, by Wilhelm F. Schmidt. The Search for Uranium, Part III.  
September—The Blister Hypothesis and Geological Problems, by C. W. Wolfe. The Green River Oil Shales, by Jerome Eisenberg.

October—Mt. Mazama and Crater Lake, by Jerome Eisenberg.  
November—Geophysical Exploration With the Airborne Magnetometer, by Homer Jensen.  
December—South Central New Mexico's Sinkholes and Craters, by Alfred M. Perkins.

### 1950

January—The Arkansas Diamond Area, by J. R. Thoenen, etc.  
February—Archeology and Geology of Northwestern Alaska, by Ralph S. Solecki.  
April—Geology by the Mackenzie Delta, Arctic Canada, by Horace G. Richards. Geophysical Exploration, Part II.  
May—Teaching Earth Sciences in Secondary Schools, Part I, by Jerome Eisenberg.  
June—Geologic History of the District of Columbia, by Martha S. Carr. Teaching Earth Sciences in Secondary Schools, Part II.  
July—Atomic Raw Materials, Part I, by Robert J. Wright. A Geologist Visits Europe, by Horace G. Richards. Teaching Earth Sciences in Secondary Schools, Part III.  
August—Atomic Raw Materials, Part II. Sedimentation Studies at Lake Mead, by Herbert B. Nichols.  
September—Fossil Localities of Northwestern New Mexico, by H. P. Zuidema. Geochemical Prospecting for Ores, Part I, by Jerome Eisenberg.  
October—Potential Mineral Resources of Yukon Territory, by H. S. Bostock.  
November—Geological Research in Finland, by A. Laitakari.  
December—Potholes in the Navajo Sandstone, Zion National Park, by Roger L. Spitznas. The Origin of Sea Water, by Herbert B. Nichols.

### 1951

January—Evidence for a Primitive Homogeneous Earth, by Harold C. Urey. New Trilobites Described, by Herbert B. Nichols.

### 1952

July—Canon City Panorama, by Richard Pearl. Geological Features of Twin Cities, by George A. Thiel. Chubb Crater, by V. Ben Meen.  
September—Studies in Coal, by Frank L. Fleener. Minerals of Eastern Federation, by H. L. Woodruff. Asteriated Gems, by Dr. W. B. S. Thomas.  
November—Rattlesnake Butte, by June Zeitner. Meteorites of Xiquipilco, by H. H. Nininger. Studies in Coal, Part 2. Fleener.

### 1953

January—Unakite Granite of Virginia, by Dr. Waldo Jones. Famous Lost Mines, the Lost Chinese Rocker, by Victor Shaw. Studies in Coal, Part 3.  
March—Atomic Research at Argonne Laboratory, by Robert B. Laraway. Lapidary Topics, Sawing, by William J. Bingham. Silver Islet, by Dr. Frank Fleener.  
May—Crown Jewels of England, Dr. J. W. Willems. Into the Dinosaur Country, Wayland W. Magee.  
July—Indian Mining and Use of Lead, Dr. H. W. Kuhn; Pothole Erosion, R. L. Spitznas; Symmetries and Asymmetries in Meteor Crater, H. H. Nininger.  
September—In Memoriam—Bethel J. Babbitt; Is Boise Sitting on a Volcano, Rhodenbaugh; Worms, Earth Science and Evolution, Burke Smith.  
November—Clay Science, Edmond P. Hyatt; Paste-Imitations, J. W. Willems; Rare Fossil Lizards in Kansas, John Watson.

### 1954

January—Importance of Rhythmic Features, Sauvan; Juvenile Waters, Gaston Burrigide; History of Coal, IV, Frank Fleener.  
March—Mount Monadnock, Wetherbee; The Great Reptiles, Garrison; Trilobites, Montague.

## EARTH SCIENCE DIGEST

Box 1357

Chicago 90



GEMOLOGY and LAPIDARY ARTS

## ABOUT THIS LAPIDARY BUSINESS

by L. C. Aldrich, Downers Grove, Illinois

### "In a Lighter Vein"

We've talked about a lot of other things in this magazine. Now let's consider this "Lapidary" business.

Mr. Noah Webster was a man who was considered quite good at taking words apart and putting them together again and he says that the word "Lapidary" comes from the Latin word "Lapidarius" which he defines as "an artificer who cuts and polishes precious stones and gems." This is a pretty fancy description of you if you go in for this "Lapidary" business and apparently Mr. Webster was afraid of possible cases of our exalted ego because he goes on to explain that "Lapidary" is derived from two words, "Lepus" meaning rock and "delapidate." Therefore, if you consider yourself a lapidist you can be classified as one who delapidates stones.

There is nothing particularly new about this Lapidary business and I don't intend to dig up any ancient history on the subject. I don't particularly care if some prehistoric ancestor patiently rubbed a piece of precious mineral on a rock until a fairly symmetrical cut stone was achieved. Nor am I impressed by the fact that early Chinese craftsmen spent days and months patiently sculpting away on a fanciful bit of carved jade. They had plenty of time on their hands and probably enjoyed the work, and at least had something to show for their efforts. I know people who have spent years trying to make a "hole-in-one" on a golf course and when they finally succeeded, what did they get out of it? Nothing tangible, only a bill for the drinks all

'round. Maybe the ignorant Chinaman had more on the ball than the golfer and his chance "hole-in-one." I wouldn't know.

Getting back to this Lapidary business, there are two kinds of Lapidists, the professional and the amateur. The professional lapidist cuts stones for a living. Presumably he doesn't like to cut stones and never wanted to cut stones but his dad, who came from a long line of lapidists said to him: "Son, there's money in this stone cutting business." So he became a lapidist but he probably considers cutting stones as a particular chore for which he gets paid and beyond that he loses interest.



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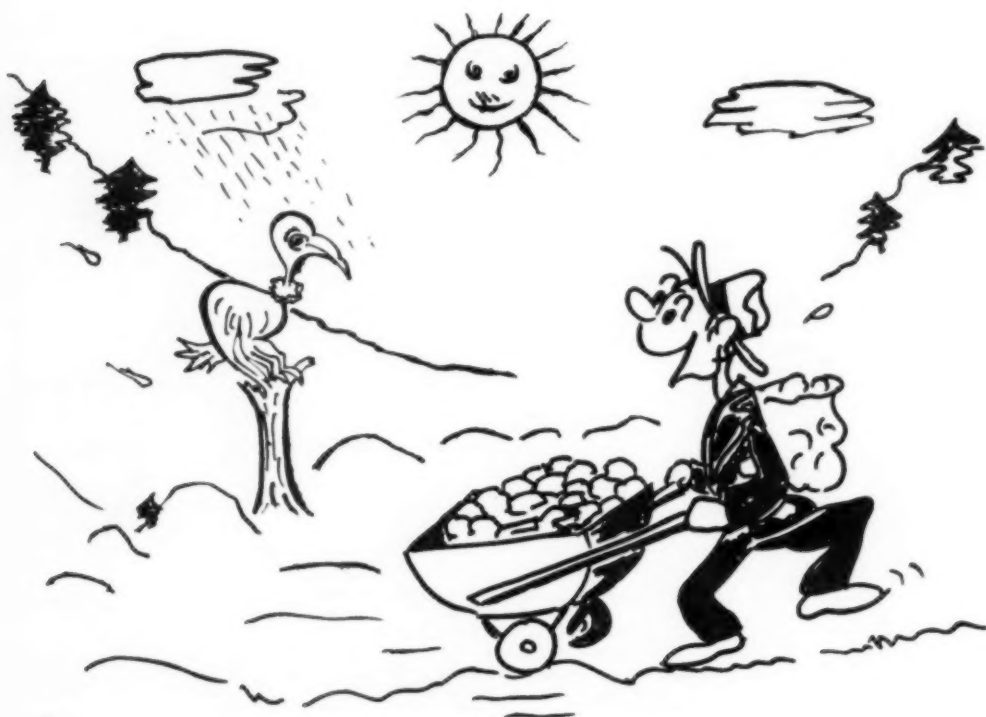
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The amateur lapidist cuts stones because he wants to cut stones. In fact, he loves to cut stones and he lives to cut stones. He even pays for the privilege of cutting stones, and Brother, how he pays!" Our interest does not lie in the first classification of lapidists who definitely have no standing in the particular chapter of the ancient and honorable Order of Rockhounds to which you and I belong. Our interest lies in the amateur lapidist, the common or gravel pit variety who spends his leisure time traveling from rock dump to rock dump, ever optimistic, ever hopeful and ever confident that in this particular rock pile he will find a very superior rock. What kind of a rock? That isn't important. There are many kinds of fine rocks any one of which will be entirely satisfactory to a true amateur lapidist. The important thing is—will it cut and is it pretty?

The amateur rock hound and lapidist is an unusual character. In his street clothes

he looks like any normal person and identification can be made only after some observation. Sooner or later he will produce his latest lapidary effort in the form of a cut stone, screw a jeweler's loupe in his eye the better to observe someone else's like offering, lick a mineral specimen or make some other of his characteristic moves. (This last operation is rapidly changing to other methods of moistening rocks such as use of a little flap moistener, a wet sponge etc., for sanitary reasons. Also there is a safety factor involved. I once knew of a rock-hound who got his tongue caught in a geode, but that is a different story.)

It is in his work clothes that the amateur lapidist is best observed. This consists of two costumes, his field outfit and his shop outfit. The field outfit consists of old and therefore comfortable clothing not unlike that worn by many others for their leisure except that the knees of his trousers always bag and his pockets always bulge. This



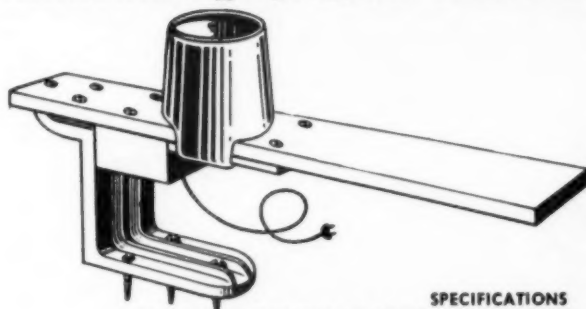
*Birdie says — I wonder who's cuckoo now.*

phenomenon is due to the abnormal amount of time spent on his knees excavating, and by his habit of carrying some five or six pounds of rock specimens in his pockets. In addition, he will usually have in his right hand a sort of a miniature pickaxe with which he 'busts' open boulders in order that he may observe the interior thereof, a wheat sack or other receptacle in which to carry added specimens that will not go into his pockets, and usually a camera. Observed in his characteristic pose as he licks a rock and studies it, it would be impossible to mistake him for anything other than what he is.

Shop uniforms vary but in general consist of well worn old clothes much spattered with white polishing compound, a shop apron intended to protect the said old clothes but which never do, and a general odor of kerosene from his diamond saw. In addition, he will generally be found holding a slab of rock or a dop stick in his hand and frequently will have a jeweler's loupe screwed in his eye.

I may have given the impression that amateur rock-hounds and lapidists are predominantly male. Far from it. The ladies, bless 'em, fill a large percentage of the rock hound ranks and as lapidists they are extremely skillful and energetic. True, they are always cleaning house in your shop which usually consists of mixing your marcasite up with the galena, writing "Chrysocola" on that new chunk of Malokite with an aluminum pencil (which won't rub off) and misplacing the nice slab of Montana agate with the pine tree. "(Gracious, I didn't do a *thing* in your dirty old work shop but put some things away! I don't see how you can find a single thing in that awful mess.)" What if they do wear grooves in your favorite grinding wheel and give your pet slab of rhodocrocite to Mrs. Jones who wants something to cut that will match her new red dress? I say of the lady rock-hounds and lapidists, bless 'em. Who else will remember to pack just the right kind of lunch for your field trip? Who else will pick sprigs of poison ivy to

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go with the lovely wild astors? Who else will 'bust' a beautiful trilobite fossil in half with a too hefty and too inaccurate swat of a rock hammer? And as for scenic effects, Brother, until you have seen a sweet young thing standing on a rock pile, slacks and shoes smeared with clay, shirt tail hanging out in back, hair flying in the wind and all exposed parts sunburned to a deep red! Brother, until you have observed this graceful creature as she daintily and in a very lady-like manner of course, licks a piece of rock that she has just picked up and which she is very sure is something very valuable, brother, you ain't seen nothin'!

It may be well to explain the difference between an amateur lapidist and a rock hound. A rock-hound is an amateur lapidist in the cocoon stage. He is very much wound up in the business of being a rock-hound and he usually has no further desire other than being a rock-hound. As such, he and his brother and sister rock-hounds joyfully roam the land energetically gathering miscellaneous minerals by the ton to be

placed in sundry boxes in the basement and never again looked at.

But, as is the case of the caterpillar and the butterfly, there will come a day when he will emerge from his rock-hound cocoon. The incubation period is not definite and the change may be due to many things, but usually it will be caused by a rock. Not just any rock that looks different, feels different and unquestionably is different. There is that something about this particular rock that hints at what is to be found inside of it. What is it? Who can tell? Maybe the rhyolite coating of a thunder egg—maybe the water worn pitted surface of a banded agate. Any day, our rock-hound just has to see the inside of that rock. And so he buys a diamond saw, cutting wheels, abrasive disks, polishing compounds and other et cetera too numerous to mention and overnight he becomes a lapidist and immediately becomes a figure of importance in his rock-hound society.

*(Continued on Page 31)*



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80, 100, 120, 180, 220 .....	\$ .83	\$ .52	\$ .39	\$ .30
2F (320), 3F (400) .....	.88	.57	.41	.32
Graded 400 .....	1.09	.73	.57	.48
Graded 600 .....	1.35	.94	.78	.69

### DURITE (Silicon Carbide) ROLL SANDING CLOTH —

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### Round Disks of Durite Dry Type Sanding Cloth —

Available in 120, 220, 320 grits

6" round disks .....	10 for \$1.00; Quire of 24 \$2.00
8" round disks .....	6 for 1.00; Quire of 24 3.75
10" round disks .....	3 for .90; Quire of 24 5.90

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Available in 150, 220, 400, 600 grit

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8" round disks .....	3 for 1.00; Quire of 24 5.90
10" round disks .....	3 for 1.35; Quire of 24 9.25

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8" diameter by .032" thick .....	10.40	16" diameter by .050" thick .....	28.60
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In conclusion, I say of the rock-hounds and amateur lapidists, Bless 'em, may their tribe increase. May they ever roam the land and wade the streams beds in search of the elusive trilobite and the thunder egg. The whole world is their geode and it is up to them to crack it. They live the Nomadic life of the Gypsy and they love it. Their societies are far reaching and friendly, their pass word and letter of introduction a rock. And they know that as the old family jalousy works its way from one rock pile to the next there is a very special providence watching over their welfare. Should "Old Faithful" blow a gasket or a tire or should any of the hundred unfortunate incidents

that plague one on a vacation occur, they know that help is at hand. They know that they have merely to get out of the car and assume the official rock-hound position, hands behind back, shoulders bowed and head down, and start searching. In a matter of minutes the squeal of hastily applied brakes will be heard and a cheerful voice will sing out "What ever you're looking for brother have you found any yet?" And help is at hand.

Yes sir, the rock-hounds and their associates—the amateur lapidists are wonderful people and they have the most fun. May their tribe ever increase, and their enthusiasm be not diminished.

## DIAMONDS ARE GEM DEALER'S BEST FRIENDS

### SALE OF STONES EXCEEDS PREVIOUS RECORDS

From London, by way of the *Chicago Tribune's* Press Service, comes the news that business is brisk in "Hatton Garden," the grimy little London back street where 95 per cent of the world's diamond trade is handled. Gem stones, the coveted brilliants which earn the biggest profits, are selling faster than ever before, says De Beers Consolidated Mines, which, directly or indirectly, controls about nine-tenths of the world diamond output.

Sales of gem stones during the first three months of the current year totaled \$40,620,000, which is about 3 million dollars more than in the previous quarter, and the highest in any three month period ever recorded.

#### *Fewer Industrial Stones*

The buying of industrial diamonds for use in mining drills, gauge points, coring machines, abrasive wheels, and other purposes has decreased slightly in recent months.

"Hatton Garden" lives on gem stones, and when the brilliants are in demand, the garden blooms in the eyes of the diamond men.

Headquarters of the diamond industry is a cluster of tiny offices on the fringe of "Hatton Garden" where the Diamond

Trading company and its associate, Industrial Distributors (Eales) Ltd., hold sway. There, once a month, packages of diamonds are offered at sales, known as "sights" to accredited buyers.

#### *For "Dealers Only"*

Few can gain entrance to the "Aladdin's cave." Admission is restricted to dealers acceptable to the diamond syndicate, the name by which De Beer's is known to the trade.

Once inside, the privileged buyers look over a collection of rough stones, seemingly more like salt crystals than precious gems. They are assembled in packages or "parcels." The viewer can buy a whole package, containing stones of various sizes, or he can decline it, but he is not permitted to select individual stones.

Grading and valuing is a matter chiefly of a keen eye and experience. The experts talk of shapes, stones, macles, flats, mecles, and cleavages in referring to stones of different sizes and qualities.

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The task of turning the dull little "pebbles" into glittering gems is left to highly skilled craftsmen. In their "Hatton Gar-

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**GEMS AND MINERALS** is owned by the California Federation of Mineralogical Societies, a federation of over 75 rockhound clubs. It is the **OFFICIAL MAGAZINE** of both the California and American Federations of Mineralogical Societies.

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## GEMS AND MINERALS

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Palmdale, Calif.

den" basement workshops they cut and polish the stones and transform them into gems fit for a dowager's tiara or a modest engagement ring.

The method of cutting diamonds with the usual 58 facets has been practiced since the 17th century when Vincenti Peruzzi, a Venetian, worked it out scientifically and introduced it as the "brilliant" cut. It brought out the full beauty of the diamond by giving it the maximum light refraction and brilliance.

Diamond merchants doubt, however, that Vincenti foresaw the use to which diamonds would be put in the twentieth century. The latest Paris conceit is to wear them glued to the face like sparkling tears.

The originator of the fashion claims that the sparkle of the jewels is matched only by the eyes of the wearer. Whose eyes wouldn't sparkle with thousand dollar tears!!

### DIAMONDS ALSO RECORD ATOMIC RADIATION

It may come as a distinct surprise to many of our readers to hear that diamonds are extremely sensitive to radioactivity and can be used to detect and measure it. Their small size permits use inside the human body or in small openings in industrial equipment.

It is said that diamond counters are more sensitive and durable than the man-made Geiger counter and there is no particular difference in cost. The purpose of a counter is to detect and measure alpha, beta, and gamma rays given off by radioactive materials.

The United States Bureau of Standards states that diamonds "have shown themselves to be at least 1,000 times more sensitive, size for size, than any man-made counter now employed."

Industrial diamonds used for counters must be colorless and flawless, the bureau said, and one out of 40 is perfect. While the diamond is a hard substance, there are tremendous spaces between its atoms.



When gamma radiation knocks a chunk, in the form of an electron, off a diamond atom, it has room to move, and in traveling creates an electrical pulse that can be measured in a similar manner as performed by the ordinary ubiquitous Geiger counter.

### ARTE DEL MOSAICO

Are you planning a trip abroad this coming summer? If so, no doubt, you will want to visit sunny Italy, and you must include the ancient city of Firenze, (Florence to us), on your itinerary.

Here, you will be able to pick up many ideas enabling you to improve your lapidary skills and technique, and perhaps learn about some things which you may want to try out for yourself upon returning home. Firenze, you must remember, is the center of the great mosaic industry, where the art has been pursued for more than a thousand years.

To quote, "Via S. Giuseppe, 36=38r (presso P. S. Aroce) telefono 26.560, Produzione di Lavori Artistiche in Pietre Dure Naturali." In short, this says that at 36/38 R Via S. Giuseppe (street address) you may visit a "manufactory of Florentine Mosaic and all kinds of artistic works in hard stones (pietre dure), made in ancient or modern style."

Factory and show rooms may be visited every day in order to see how hard stones are worked. Beautiful pieces of mosaic art may be purchased at prices to suit your pocketbook, and which for the most part seem reasonably priced. Furthermore if you do not find what you want, you may place an order, leaving a sketch or picture, and upon your return north a few days later you will find it ready and waiting for you.

Many people, who visit Italy, and even Florence itself, strange as it may seem, never know of this until after they return, and then will feel sorry for themselves the remainder of their lives for having missed seeing this, one of the most interesting industries in all Europe—hence this little plug for our friends across the sea.

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# RADIO-PICTURES and URANIUM DECAY

by Robert E. Riecker

In the following brief article we shall discuss a relatively new, but extremely important and most interesting topic. We shall explain how to perform simple experiments which will give us results worth all the time and effort we spend upon them. We shall discuss radio-pictures as concerned with uranium disintegration and other radioactive materials.

Let us begin with an explanation of the pictures shown in this article. A sheet of photographic film was laid horizontally on a block of any material. On top of this film a key or washer was placed. Then placed over the object was a radioactive mineral. A piece of adhesive tape covered the three articles to hold them in place.

comes to our minds. This explanation is not simple for it requires considerable knowledge of the theory of radio active disintegration. However, the bare facts may be explained to the satisfaction of most people.

First of all because this phenomenon occurs only with radio-active minerals or with artificially activated materials, we must understand what radioactivity is.

Radioactivity is a property of certain elements, with atomic numbers above that of lead, which causes their atomic nuclei to disintegrate gradually, forming new elements of different chemical properties than started with due to their loss of electrons. The elements of numbers above lead, are



*Radio-picture of key made by author.*

This was all done in the black of a photographic dark-room or some other equally dark place. The materials held in place with the tape were left in the dark for from 48 to 108 hours. At the end of this time the film was removed, developed, and printed. The printing revealed an almost perfect picture taken of the object used.

Thus immediately the question of how this happened, or what caused it to happen,

said to be unstable, and their atoms continue to explode forming new elements, which in turn re-explode again and again until the final stable element lead is reached. In other words decay is the ability of specific elements to form new substances out of the original radio-active ones.

The rate at which these materials decay and transmute is measured in time, called half life. In the first half life the amount

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—W. H. Hooper.

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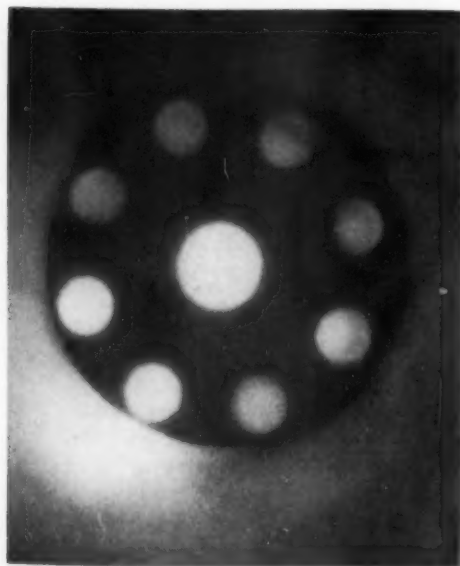
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of material left unchanged is half the original amount, and in the next half life the amount remaining is one-fourth the original amount, and so on and on until, theoretically at least, the point of stability is reached.

The half life of materials varies widely; for uranium-238 it is about 4.67 billion years, or for half an amount of uranium to change to another material a period of the above stated time is required. Radium takes 1,690 years; for polonium-210 the half life is 136 days, and for a special type of polonium-214 the time is approximately one millionth of a second.

In the breaking down of these materials, by-products of energy are released in the form of rays and particles. They are alpha particles, beta particles, and gamma rays. These rays cause the exposure of the film, but let us go further to see which rays give us the strongest reaction.



*Radio-picture made by author.*

The alpha particle is a fast moving nuclei of ordinary helium gas. It is a positive charged particle which can penetrate a substance to the extent of less than a sheet of aluminum foil. A beta particle is a negatively charged substance and is simply a highspeed electron having the energies such

as would be obtained by accelerating an electron by a potential of several million volts. The processes involved here are not too well understood at present. The most important of the rays given out is the gamma ray which is an extremely high-powered short wave light ray, shorter than the X-ray which is said to be the second most powerful.

Gamma rays are those which make radioactive materials so deadly for they can penetrate even a sheet of lead where as the beta particles are stopped with a thin sheet of aluminum.

Therefore we may assume that disintegration is the process of spontaneous nuclear change in which a beta and alpha particle are given off from the nucleus, leaving that substance with a different atomic number. The gamma rays come from the inner atom itself rather than from the electrons outside the nucleus.

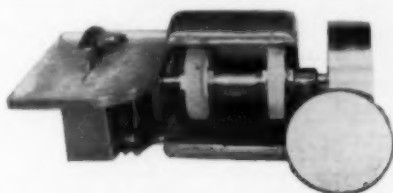
All this was discovered and brought to man's attention by Madame Curie in 1898 after effects had been discovered on photographic plates from radioactive materials.

Not all minerals give off the above particles and rays, and of course they give them off in varying amounts. Pitchblende or uraninite gives the best results in the radio-picture experiment. Super-sensitive film should be used but this is not necessary. No light must be permitted to enter the place of experiment as any light will expose and neutralize the film, tending to kill the effects of the rays from the material.

Thus, we may summarize the following information: Materials with an atomic number of lead or higher are found to decay at varying rates of time. The decay releases energy in the form of beta and alpha particles with gamma rays which are strong enough in some materials to expose film if left in the dark for a time. This was found to be true by Madame Curie in the latter part of the 19th century.

We may also assume that most radioactive materials or minerals will give off energy in some degree, although they may

*(Continued on Page 44)*



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OFFICIAL ORGAN OF MIDWEST FEDERATION

## MIDWEST CLUB NEWS

**Bernice Wienrank, Club Editor**

WISCONSIN GEOLOGICAL SOCIETY, host to the Midwest Federation Convention to be held June 24-26 in Milwaukee, urges all members who plan to attend the event to bring a rock or a book for the convention auction, which will be held to provide funds for the Federation Treasury.

WGS, as part of its program to extend interest in the earth sciences, has presented each of the following Wisconsin educational institutions with a three-year subscription to the *Earth Science Digest*:

Beloit College, Lawrence College, Ripon College, Wisconsin State College (at Oshkosh), Wisconsin State College (at Milwaukee), Marquette University.

Might not this gesture be profitably followed by other earth science organizations in the Midwest Federation, thus leading students in institutions of higher learning to a greater familiarity with the earth sciences?

CHICAGO LAPIDARY CLUB will hold its fourth annual Gem and Jewelry Show May 14-16 at the Hamilton Park field house, 72nd and Normal, Chicago. The show is competitive and both trophies and ribbons will be awarded to winning entries.

INDIANA GEOLOGY AND GEM SOCIETY will award a beautiful faceted Cairngorm smokey quartz crystal to the member who submits the winning name for the club's bulletin. The crystal was donated by club prexy Francis Hueber.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS recently heard Mr. Ray Bish, metallurgical engineer and rockhound hobbyist, talk on "Rocks and Minerals as a Hobby." Mr. Bish amplified his talk with a series of well planned exhibits.

NEBRASKA MINERAL AND GEM CLUB has wired the following protest to Congressman Harrison, Chairman of the House sub-committee on irrigation and reclamation:

"The Nebraska Mineral and Gem Club of Omaha is opposed to any violation of our national parks and monuments by development and reclamation. These dedicated nature areas should be kept natural. We are informed that the proposed Echo Park Dam would inundate major geological features of the Dinosaur National Monument in Colorado. This would be the initial gesture towards destruction of our national preserves, which might lead to the eventual destruction of our entire conservation idea. We ask you to oppose this threat."

CENTRAL ILLINOIS ROCK-HOUNDS on April 11 heard an informative lecture on "Sea Shells" by Mr. S. E. Farin of Springfield, Ill. Afterwards, Mr. Farin presented each member present with a sea shell and instructions for making an ornamental pin.

MICHIGAN MINERALOGICAL SOCIETY on April 12 heard Mr. H. R. Straight, a past president of the Midwest Federation, speak on "Petrified Woods and Their Identification." Mr. Straight illustrated his lecture with excellent specimens and beautiful slides of petrified wood.

EVANSVILLE LAPIDARY SOCIETY has been invited to exhibit at the spring

Festival of the Evansville Trinity Methodist Church. ELS plans to make this display a preview of the exhibit that the group will show at the Midwest Federation Convention in Milwaukee, June 24-26.

ROCHESTER EARTH SCIENCE SOCIETY recently heard a talk on "Radioactive Dating" by Dr. Marvin Williams, noted physicist. After his talk, Dr. Williams used a geiger counter to test RESS members' mineral specimens for radioactivity.

RESS is sponsoring a course on "The Geology and Rocks of Some of Our National Parks" at the Rochester Evening Community College. The course, which consists of six lectures, is being presented by Dr. Duncan Stewart, Jr., chairman, of the geology department at Carleton College, Northfield, Minn.

CEDAR VALLEY ROCK AND MINERAL SOCIETY at its February meeting heard a very informative lecture on "Circulating Water and Mineral Collecting"

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No. 67—Rhodolite Garnet. Intriguing orangey-pink-red, 3 to 4mm rd.; great bargain. \$2.85 per doz.



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No. N1—Baroque Nacre Nuggets. Shimmering, pearly, precious-looking, center hole for easy mounting; Mixed 1/2" to 1", \$1.25 per doz.

No. 271—Stag Horn Crowns. The strange bifurcated base from which two cut-off branches 1 to 2" thick, rise and spread 3 to 4". Carve them, slice them into dozens of buttons, free-forms, sections, insulators, etc.; or use as handles, coat hooks, etc. Works easily, polishes beautifully. \$1.50 ea.

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No. 267—Ivory Skulls. Hand carved and primitive, like African fetish objects. Full-face skull with flat back for easy setting, or tiny holes in eye sockets may be used for sewing, riveting or wiring. Make extraordinary earrings, cuff-links, buttons, etc. Good 1/2 x 3/8", time mellowed ivory. Incredibly priced but act quickly, only . . . 65c ea.; 6 for \$3.50

Same, but a trifle smaller, 2 for \$1.00.

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by Prof. Leonard Weis, head of the geology department at Coe College, Cedar Rapids, Iowa.

**MINNESOTA MINERAL CLUB** on April 11 held its ninth Annual Gem and Mineral Show at Coffman Union Hall in Minneapolis. On display were gems, minerals, fossils and meteorites. It was well attended by the public.

**CHICAGO ROCKS AND MINERAL SOCIETY** on April 10 heard Dr. Ben Hur Wilson lecture on "The Earth as a Planet." Dr. Wilson, who is editor of the *Earth Science Digest*, a past president of the American Federation of Mineralogical and Geological Societies and a former instructor of geology at the Joliet Junior College, is an authority on the subject.

#### NEWS OF OTHER SOCIETIES

**NATRONA COUNTY ROCK- HOUND CLUB** will sponsor the Wyoming Gem and Mineral Show to be held June 4-6 at Casper, Wyo. The show will cover all forms of rockhound activities and the exhibits will feature polished gems, minerals, fossils and Indian artifacts.

Casper, Wyo., is in the midst of wonderful rock hunting territory in the heart of the Rockies. NCRH has promised to tell interested visitors where to look for these rocks.

**REX YOUNG SOCIETY OF ROCK HOUNDS** (Torrington, Wyo.) is enjoying a series of seven lectures by Dr. Allen Shaw, an invertebrate paleontologist from the University of Wyoming. Practical geology is the general subject of these lectures.

The society meets the first Wednesday evening of each month at the University of Wyoming. Visitors are welcome.

**HUMBOLDT GEM AND MINERAL SOCIETY** has taken out a group insurance policy to provide benefits to members who are injured on field trips or other activities sponsored by the society.

**BLUE MOUNTAIN GEM CLUB** is currently displaying at both the Public

Library and Clark's Stationery store in La Grande, Ore. Featured at the library is a rough rock, a slab from the rock and a finished cabochon from the slab. The exhibit at Clark's Stationery includes "picture" cabochons, obsidian arrow heads, a 25-pound piece of jade and scenic Egyptian desert rock.

**OKLAHOMA MINERAL AND GEM SOCIETY** recently held a rockhound quiz program with Alvin Markwell acting as emcee. If a contestant answered his first question correctly, he was awarded a small quartz crystal. With each succeeding correct answer, he was permitted to exchange his crystal for a larger one, but if he missed a question he lost possession of the crystal previously acquired. No contestant was permitted to leave empty handed, however, and everybody had fun.

**WASATCH GEM SOCIETY** recently heard Buford Thomas of the Indian Trading Post give an informative talk on "Indian Jewelry and Silversmithing."

WGS meets the third Tuesday of each month at Fairmont Park Clubhouse, 2361 S. 9th St., Salt Lake City, Utah. Visitors are welcome.

**OREGON AGATE AND MINERAL SOCIETY** is cooperating with the Oregon State Department of Geology in the compilation of a fossil leaf map of western Oregon. Each member has been requested to report the exact location of occurrences of fossil leaves of which they may know.

**COLORADO MINERAL SOCIETY** recently heard an engrossing lecture on "Precious Opal, its Romance and Lore," by Mrs. M. H. Ziegler. On display was the magnificent collection of cut opals belonging to Mrs. Ziegler's father-in-law, Dr. Victor Ziegler, a famous geologist.

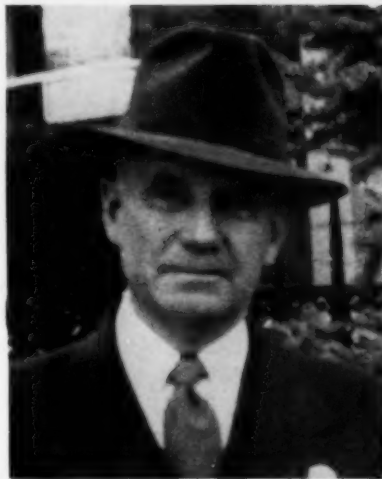
**MINERALOGICAL SOCIETY OF PENNSYLVANIA** held its second Mineral Symposium on March 14 at Marion, Penn. All phases of the earth sciences were represented in the exhibits. Also on display were fine examples of lapidary art. The Symposium was attended by 550 people.

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**SAN DIEGO LAPIDARY SOCIETY** recently made a three-day field trip to the Tumco area, located near Ogilby, Calif., for petrified palm and tule, ribbon agate and bloodstone. The best find, a piece of petrified palm root as large as a man's head, was made by Zee Pegram, original discoverer of the Tumco hunting area.

**DELVERS GEM AND MINERAL SOCIETY** at its March meeting heard Mrs. Dorothy Craig, president of the California Federation of Mineralogical Societies, speak on "Gold in the Mother Lode."

In lieu of its March field trip, DG&MS on March 29-31 attended the California Federation Convention at Indio, Calif.

**COLUMBIAN GEOLOGICAL SOCIETY** (Spokane, Wash.) on April 1 held an open house at the Finch Arboretum. CGS members and two guest clubs, North Idaho Mineral Club and Inland Empire Rockhounds, displayed 24 exhibits of fossils, arrowheads, minerals, fluorescent rocks, and polished slabs and cabochons. Colored slides were also shown.

#### CLUB OFFICERS PLEASE NOTE:

Your Cooperation Solicited

\* *Societies are urged to send reports of their activities to this department, c/o Bernice Wienrank, 4717 N. Winthrop Ave., Chicago, Illinois. Will all Club Bulletin Editors please see personally that our Club Editor's name gets on their mailing list promptly.*

#### HONOR ROLL

The *Earth Science Digest* salutes the following societies for these contributions to schools, hospitals and museums:

**CENTRAL IOWA MINERAL SOCIETY**—lectures to local schools and presentations of mineral specimens to start student collections.

**HUMBOLDT GEM AND MINERAL SOCIETY**—donation of mineral specimens to the Eureka Museum.

**MICHIGAN MINERALOGICAL SOCIETY**—donation of several thousand dollars worth of mineral specimens to the Cranbrook Institute of Science.

**NEBRASKA MINERAL AND GEM CLUB**—donation of polished cabochons for a permanent display to the University of Nebraska.

**SAN DIEGO LAPIDARY SOCIETY**—instruction in the art of lapidary and donation of gem materials to patients in the San Diego Naval Hospital.

**SANTA FE GEM AND MINERAL CLUB**—donation of a handmade cabinet for displaying rocks to the Santa Fe, New Mexico Chamber of Commerce.

**WISCONSIN GEOLOGICAL SOCIETY**—donation of fossils from Wisconsin from the Ordovician, Devonian and Silurian periods to the British Museums of Natural History; presentation to the Milwaukee Public Library and all colleges in Wisconsin of three-year subscriptions to the *Earth Science Digest*.

---

#### RECOMMENDED READINGS FROM SOCIETY BULLETINS

"Occurrence of Inter-Crystalline Sipunculoidea in Gem Minerals," by Domer Howard, January issue of *Sooner Rockologist*. A delightful take-off on Agate Pete's "Agate Eaters."

"Black Hills Region," by Harriet Lulling, March issue of *Rock Rustlers News*. A guide to the highlights of the Black Hills Region.

"Geodes," by R. Van Scyoc, March issue of the *Evansville Newsletter*. Man has long speculated on how these odd rock specimens were formed; Mr. Van Scyoc presents some interesting conclusions.

"Fossil Thoughts," by George Ashley, March issue of the *Keystone Newsletter*, refutes the idea that "fossils are the concentrated essence of senile uselessness."

"Cleaning Crystal Specimens," by A. L. McGuiness, February issue of the *Oregon Rockhound*. For a sparkling crystal collection, follow Mr. McGuiness' Instructions.

"Pyrite and Marcasite at Oshkosh and Racine," by James Montague, March issue of the *Trilobite*. A detailed and authoritative discussion of pyrite and marcasite.





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**U. S. GEOLOGICAL SURVEY BULLETINS**, other publications, back numbers bought and sold. Also files of periodicals. **J. S. CANNER & Co., Inc.**, Boston 19, Mass.

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**WORLD FAMED JADE WINDOW**, fully described, with two illustrations, in Nov. 1952 issue of Earth Science Digest. This is rare issue. While they last 35¢ each. **EARTH SCIENCE DIGEST**, Box 1357, Chicago 90.

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### RADIO-ACTIVE PHOTOS

*(Continued from Page 36)*

not give off all three forms of ray energy. Therefore the longer a material is left to expose film, the brighter the image on the film should be. No camera is needed and no other equipment is used in taking radio-pictures.

Pitchblende will give the best results, for it is strongest in content of uranium and hence, stronger in radiation. Also carnotite, autinite, monazite sand, thorite, tor-nernite and a few other minerals are known to give photographic results.

Although this is not a standard test for the determination of radioactivity for minerals, it has been used and will give satisfactory results.

We are well aware that we have scarcely scratched the surface of the subject of radiochemistry in this short discussion, but for those who may have been stimulated by this article, and desire more information than here given, we would recommend the following list of references:

1. Constructive Uses of Atomic Energy—S. C. Rothmann
2. One World or None—N. Bohr & A. H. Compton

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8. Radiology Physics—J. K. Robertson
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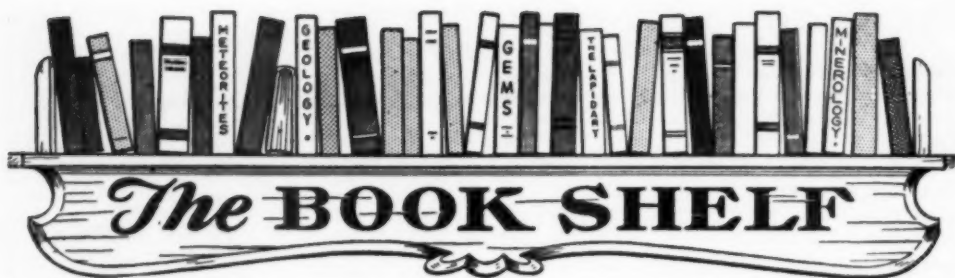
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**GRAVEL GOLD**—Harriett H. Carr, Farrar, Strauss and Young, Inc., New York, N. Y.

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filled its pages. This is a fascinating novel that you can't put down until the last shot is fired or someone gently but firmly takes you by the hand and steers you back to the present hysteria of the Atomic Age. Try this book if you don't believe me.

W.H.A.

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Splendidly illustrated, the author's wife has collaborated with him in the preparation of the drawings, which add much not only to the enjoyment of the text, but to its understanding as well.

B. H. W.

**RECORD OF THE ROCKS**—Horace G. Richards, Ronold Press Co., New York: Here is a new and exciting book relating "The Geological History of Eastern North America" written by Horace G. Richards, Lecturer in Geology at the University of Pennsylvania, which immediately commands the attention of the reader.

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**W. H. A. SKETCHES OF IDAHO GEOLOGY—**Professor Edward Rhodenbaugh. 250 pp., Caxton Press, 1302 Hays St., Boise, Idaho. \$5.00. (Discount to Schools and Libraries).

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(Continued to Page 48)

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5. Waters Under the Earth.—Our hidden wealth of precious underground water.
6. Glaciers in Idaho.—These formerly carved our mountain scenery and left a legacy of marvelous lakes.
7. Work of the Winds.—Their gift:—Our picturesque dunes and our inexhaustible volcanic soils.
8. Volcanoes and Lava Flows.—From very ancient to quite recent in age.
9. Rocks of Idaho.—Modes of classifying them and their various origins.

10. Earth's Crust—Its Structure and Deformations.—Why and how of our mountains.

These are the individuals and groups that have thus far been interested: Civil and mining engineers, officials of water and irrigation companies, teachers of geography, Boy Scouts, "rock hounds" in gem and mineral clubs, prospectors and students in high schools and colleges—in fact anyone who is curious about the structure and makeup of our old Earth, our home.

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## Officers 1953-54

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## Affiliated Societies 1953-1954

### AKRON MINERAL SOCIETY

President: Harold C. Treese, 1895 Manchester Road, Akron 14, Ohio.

Meetings: The 3rd Saturday. Call an officer for meeting place.

### CEDAR VALLEY ROCKS AND MINERALS SOCIETY

President: William Willison, 1638 E. Avenue, N. E. Cedar Rapids, Iowa.

Meetings: Contact officers for particulars.

### CENTRAL ILLINOIS ROCKHOUNDS

President: George M. Davis, 141 East Main Street, Decatur, Illinois.

Meetings: "Fellowship Hall," Y.W.C.A. Decatur.

### CENTRAL IOWA MINERAL SOCIETY

President: Frank J. Sadilek, 1308 W. 42nd Street, Des Moines, Iowa.

Meetings: The 1st Friday, 7:30 P.M. Drake University Bible Building.

### CENTRAL NEBRASKA ROCK AND MINERAL CLUB

President: Leonard C. Hill, 612 North Lexington Ave., Hastings, Nebraska.

Meetings: The 3rd Thursday, 8:00 P.M. "House of Yesterday," Hastings.

### CHICAGO LAPIDARY CLUB

President: John I. DeLong, 7662 South Shore Drive, Chicago 49, Illinois.

Meetings: The 1st Thursday, 8:00 P.M. Gage Park Field House, Chicago.

### CHICAGO ROCKS AND MINERALS SOCIETY

President: Helen L. Cooke, 2952 North Laverne Avenue, Chicago 41, Ill.

Meetings: The 2nd Saturday, 7:45 P.M. Green Briar Park Field House,

### CINCINNATI MINERAL SOCIETY

President: Charles L. Gschwind, 6931 Diana Drive, Cincinnati 24, Ohio.

Meetings: Contact officers for dates. Cincinnati Museum of Natural History.

#### **CLEVELAND LAPIDARY SOCIETY**

Secretary: John M. Heffelfinger, 7619 Redell Avenue, Cleveland 3, Ohio.

Meetings: Communicate with the secretary for information.

#### **EARTH SCIENCE CLUB OF NORTHERN ILLINOIS**

President: J. E. Farr, 5401 Webster Avenue, Downers Grove, Illinois.

Meetings: The 2nd Friday, 8:00 P.M. Downers Grove High School.

#### **EVANSVILLE LAPIDARY SOCIETY**

President: Mrs. Glen A. Black, Angel Mounds, Newburgh, Indiana.

Meetings: Communicate with the officers for information.

#### **FLINT HILLS GEOLOGY CLUB**

President: Albert Thomas, 820 Union, Emporia, Kansas.

Meetings: The 3rd Monday, 7:30 P.M. Kansas State Teachers College.

#### **FORT RANDALL GEMITES**

President: Edgar Wright, Pickstown, South Dakota.

Meetings: The 3rd Thursday. Contact the officers for place.

#### **FREEBORN COUNTY GEMS AND MINERALS CLUB**

President: Clifford Benson, Hollandale, Michigan.

Secretary: J. M. Snyder, Y.M.C.A. 115 N. Newton, Albert Lea, Minnesota.

#### **GEODE ROCKS AND MINERALS SOCIETY**

President: Mr. E. N. Smith, New London, Iowa.

Meetings: The 3rd Friday, 7:30 P.M. Community Hall, New London, Iowa.

#### **GEOLOGICAL SOCIETY OF MINNESOTA**

President: Dr. Bert Carlson, 3034—46th Avenue South, Minneapolis 6, Minn.

Meetings: Each Tuesday not a holiday, 7:30 P.M.; Auditorium, Minnesota Museum of Natural History, University of Minnesota.

#### **HEART OF AMERICA GEOLOGY CLUB**

President: Robert Leininger, 510 East 77th Street, Kansas City, Missouri.

Meetings: Communicate with the officers for information.

#### **ILLOWA GEM AND MINERAL SOCIETY**

President: Irving Hurlbut, 2612 East 32nd Road, Davenport, Iowa.

Meetings: Davenport Public Museum. Communicate with the officers.

#### **INDEPENDENCE GEM AND MINERAL SOCIETY**

President: Jerry Manning, 1525 Maywood Avenue, Independence, Missouri.

Meetings: The last Tuesday. 8:00 P.M. Jackson Co. Public Library.

#### **INDIANA GEOLOGY AND GEM SOCIETY**

President: Francis M. Hueber, 1603 Central, No. 115, Indianapolis, Indiana.

Secretary: Miss Florence Geisler, 2267 N. Dearborn St., Indianapolis, Indiana.

#### **ISHPEMING ROCK AND MINERAL CLUB**

President: Robert Davis, 206 Oak, Ishpeming, Michigan.

Secretary: Charles Markert, 107 Ridge, Ishpeming, Michigan.

#### **JOLIET JUNIOR MINERALOGISTS**

Teacher-sponsor: Noble Benjamin, 1423 Cornelius, Joliet, Illinois.

Meetings: Bi-monthly. After School, Room 193, Joliet Township High School.

#### **MADISON GEOLOGICAL SOCIETY**

President: Mrs. Charles Hemingway, 5741 Old Sauk Road, Madison 5, Wisc.  
Meetings: The 2nd Tuesday, 7:30 P.M. Agronomy Bldg., U. of W. Campus.

#### **MARQUETTE GEOLOGISTS ASSOCIATION**

President: Ray C. Mitchell, 2753 Hawthorne, Franklin Park, Illinois.  
Meetings: The 1st Saturday, 8:00 P.M., Chicago Academy of Sciences.

#### **MIAMI VALLEY MINERAL AND GEM CLUB**

President: Raymond W. Downey, 321 Bellavie Avenue, Springfield, Ohio.  
Meetings: The 2nd Sunday, 2:00 P.M. Y.M.C.A., Fairborn, Ohio.

#### **MICHIGAN MINERALOGICAL SOCIETY**

President: John C. Thornton, 502 Laurel, Royal Oak, Michigan.  
Meetings: The 2nd Monday, 8:00 P.M. Cranbrook Institute of Science.

#### **MINERALORISTS SOCIETY OF JOLIET**

President: George R. Wells, 1100 Taylor, Joliet, Illinois.  
Meetings: The 2nd and 4th Tuesday, 7:00 P.M. Room 103, J.T.H.S.

#### **MINNESOTA MINERAL CLUB**

President: Leroy Peterson, 2626 Riverside South, Minneapolis, Minnesota.  
Meetings: The 2nd Saturday. Communicate with an officer for place.

#### **MISSOURI VALLEY MINERAL CLUB**

President: Cyril A. Carpenter, 2906 Sylvania, St. Joseph, Missouri.  
Meetings: Communicate with the officers for information.

#### **NEBRASKA MINERAL AND GEM CLUB**

President: Thomas A. Cherry, 1925 South 61st Avenue, Omaha 6, Nebraska.  
Meetings: The 3rd Wednesday, 7:30 P.M., Joslyn Memorial Museum.

#### **NORTHWESTERN MICHIGAN MINERAL CLUB**

Secretary: Jim C. Moulton 341 Front Street, Traverse City, Michigan.  
Meetings: Communicate with the secretary for information.

#### **ROCK AND RILL CLUB**

President: Mrs. Edwin P. Olson, Box 425, Beresford, South Dakota.  
Secretary: Nora Christensen, Route 1, Viborg, South Dakota.

#### **ROCHESTER EARTH SCIENCE SOCIETY**

President: Harold Whiting, 1521—9th Avenue N.E., Rochester, Minnesota.  
Meetings: The 2nd Monday. Call officers for time. Central School.

#### **ST. LOUIS MINERAL AND GEM SOCIETY**

President: Charles C. Crosswhite, 8913 White Avenue, Brentwood, Missouri.  
Meetings: The 1st Friday, 7:30 P.M., Chateau House of St. Louis Univ.

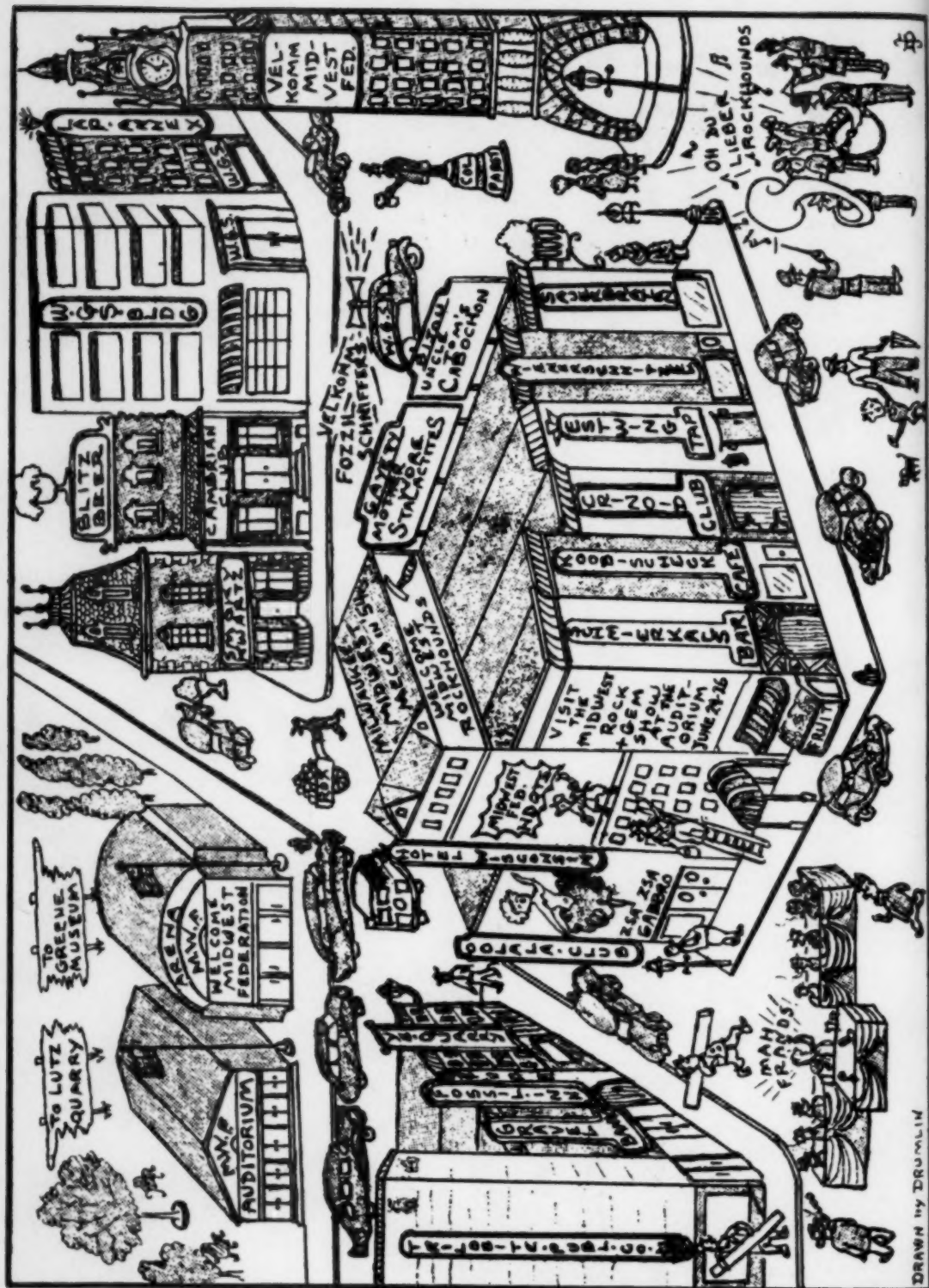
#### **WINNEBAGO ROCK AND MINERAL SOCIETY**

President: Herman Hollub, 1321 Georgia Street, Oshkosh, Wisconsin.  
Secretary: Mrs. R. A. Honweiler, 56 W. Irving Street, Oshkosh, Wisconsin.

#### **WISCONSIN GEOLOGICAL SOCIETY**

President: Elmer R. Wurl, 5471 N. 42nd St., Milwaukee 9, Wisconsin.  
Meetings: The 1st Tuesday. Main Lecture Hall, Milwaukee Public Museum,





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